

To:

John Fortman

From:

John D. Baranzelli

Subject:

Pavement Design

Date:

July 24, 2013

FAU 3502 (US Route 45) Lake County From IL 60 to IL 22

We have reviewed the pavement design for the above captioned section, which was submitted to BDE on June 17, 2013. LCCA favors the rigid pavement design by more than 10%, and does not require alternate bidding. The approved pavement design is as follows:

Attn: District One

US 45 at IL 60 [Reconstruction]
US 45 at IL 83 [Reconstruction]

9.75 inches of PCC Jointed Pavement with Tied PCC Curb & Gutter12 inches Aggregate Subgrade Improvement

US 45 from IL 83 to IL 22 [Reconstruction]

US 45/IL 21 at West Olde Half Day Road [Reconstruction]

US 45/IL 21 at IL 22 [Reconstruction]

US 45/North Olde Half Day Drive at US 45/IL 21 [Reconstruction]

US 45 at Ranney Avenue [Reconstruction]

9 inches of PCC Jointed Pavement with Tied PCC Curb & Gutter 12 inches Aggregate Subgrade Improvement

IL 21 from US 45 to Georgetown Way [Reconstruction]

9.25 inches of PCC Jointed Pavement with Tied PCC Curb & Gutter12 inches Aggregate Subgrade Improvement

The following pavement designs are subject to local jurisdictional concurrence:

Oakwood Road [Reconstruction]
Evergreen Drive [Reconstruction]
Deerpath Drive [Reconstruction]
Marriot Drive [Reconstruction]

7.75 inches of PCC Jointed Pavement with Tied PCC Curb & Gutter 12 inches Aggregate Subgrade Improvement

<u>Fairway Drive/Buffalo Grove Road [Reconstruction]</u>
<u>Butterfield Road [Reconstruction]</u>

8.5 inches of PCC Jointed Pavement with Tied PCC Curb & Gutter 12 inches Aggregate Subgrade Improvement

<u>Jamestown Lane/Port Clinton Road [Reconstruction]</u> <u>Jewel Osco Entrance [Reconstruction]</u>

9.25 inches of PCC Jointed Pavement with Tied PCC Curb & Gutter 12 inches Aggregate Subgrade Improvement

If you have any questions, please contact Paul Niedernhofer at (217) 524-1651.

To:

John D. Baranzelli

Attn: Paul Niedernhofer

From:

John Fortmann

Bv:

M. Mangoba/J. Dominguez

Subject:

Pavement Analysis

Date:

June 17, 2013

Route: FAU 3502 (US 45) Limits: from IL60 to IL22

Section: 49-Y County: Lake Contract No.: 60N84 Job No.: D-91-408-11 Current target: 06CY14

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. The following is the scope of the project:

- a) Pavement reconstruction on US 45 at IL 60
- b) Pavement reconstruction on US 45 at IL 83
- c) Pavement reconstruction on US 45 from IL 83 to IL 22
- d) Pavement reconstruction on US 45/IL 21 at West Olde Half Day Road
- e) Pavement reconstruction on US 45/IL 21 at IL 22
- f) Pavement reconstruction on US 45/North Olde Half Day Dr at US45/IL 21
- g) Pavement reconstruction on US 45 at Ranney ave
- h) Pavement reconstruction on Oakwood Rd
- i) Pavement reconstruction on Evergreen Dr
- j) Pavement reconstruction on Deerpath Dr
- k) Pavement reconstruction on at Marriott Drive
- I) Pavement reconstruction on Fairway Dr/ Buffalo Grove Rd
- m) Pavement reconstruction on Butterfield Rd
- n) Pavement reconstruction on Jamestown lane /Port Clinton
- o) Pavement reconstruction on Jewel Osco Entrance
- p) Pavement reconstruction on IL 21 from US 45 to Georgetown Way

A 20-year pavement analysis was performed on the segments below. We recommend a mechanistic-rigid pavement design on the segments below based on the life cycle cost analysis which favors Portland Cement Concrete pavement by 23%. Recommendations for each segment are as follows based on the mechanistic pavement design procedure using life cycle cost analysis.

John D. Baranzelli June 17, 2013 Page Two

a) US 45 at IL 60 b) US 45 at IL 83

PCC curb and gutter (tied)
Reconstruction
9 3/4" Portland Cement Concrete 1
12" Agregate Subgrade Improvement 2

A 20-year pavement analysis was performed on the segments below. We recommend a mechanistic-rigid pavement design on the segments below based on the life cycle cost analysis which favors Portland Cement Concrete pavement by 40.7%. Recommendations for each segment are as follows based on the mechanistic pavement design procedure using life cycle cost analysis.

c) US 45 from IL 83 to IL 22
d) US 45/IL 21 at West Olde Half Day Road
e) US 45/IL 21 at IL 22
f) US 45/North Olde Half Day Dr at US45/IL 21
g) US 45 at Ranney ave
PCC curb and gutter (tied)
Reconstruction
9" Portland Cement Concrete 4
12" Agregate Subgrade Improvement 2

A 20-year pavement analysis was performed on the segments below. The life cycle cost analysis does not favor either pavement by more than 10%. However, since the scope of work of the project is "less than 2 lane-miles in length" an alternate bid does not need to be considered according to section 1.04-1a of Chapter 54 of the BDE manual. Thus, a mechanistic-rigid pavement design is recommended since the life cycle cost analysis does favor PCC. The recommended pavement is:

h) Oakwood Rd ³
i) Evergreen Dr ³
i) Deerpath Dr ³
k) Marriott Drive
PCC curb and gutter (tied)
Reconstruction
7 ³/₄" Portland Cement Concrete ⁵
12" Agregate Subgrade Improvement ²

John D. Baranzelli June 17, 2013 Page Three

A 20-year pavement analysis was performed on the segments below. The life cycle cost analysis does not favor either pavement by more than 10%. However, since the scope of work of the project is "less than 2 lane-miles in length" an alternate bid does not need to be considered according to section 1.04-1a of Chapter 54 of the BDE manual. Thus, a mechanistic-rigid pavement design is recommended since the life cycle cost analysis does favor PCC. The recommended pavement is:

Fairway Dr/ Buffalo Grove Rd³ Butterfield Rd³

PCC curb and gutter (tied)
Reconstruction

8 ½" Portland Cement Concrete 6 12" Agregate Subgrade Improvement 2

A 20-year pavement analysis was performed on the segments below. The life cycle cost analysis does not favor either pavement by more than 10%. However, since the scope of work of the project is "less than 2 lane-miles in length" an alternate bid does not need to be considered according to section 1.04-1a of Chapter 54 of the BDE manual. Thus, a mechanistic-rigid pavement design is recommended since the life cycle cost analysis does favor PCC. The recommended pavement is:

n) Jamestown lane /Port Clinton
o) Jewel Osco Entrance
p) IL 21 from US 45 to Georgetown Way
PCC curb and gutter (tied)
Reconstruction
9 1/4" Portland Cement Concrete 7
12" Agregate Subgrade Improvement 2

1 Designer Note 1: Use pay item #42000416, "PORTLAND CEMENT CONCRETE PAVEMENT 9 3/4" (JOINTED)" paid for in square yards.

² <u>Designer Note 2:</u> Use pay item **#30300112**, **"AGGREGATE SUBGRADE IMPROVEMENT 12"** " paid for in square yards.

³ <u>Designer Note 3</u>: Oakwood Road, Butterfield Road, Evergreen Drive, Deerpath Drive, Ranney Avenue, Fairway Dr/Buffalo Grove rd, Jamestown Lane/Port Clinton Road, Olde half day Road and Marriott Drive and Georgetown way are subject to local jurisdictional approval and concurrence.

John D. Baranzelli June 17, 2013 Page Four

⁴Designer Note 1: Use pay item #42000401, "PORTLAND CEMENT CONCRETE PAVEMENT 9" (JOINTED)" paid for in square yards.

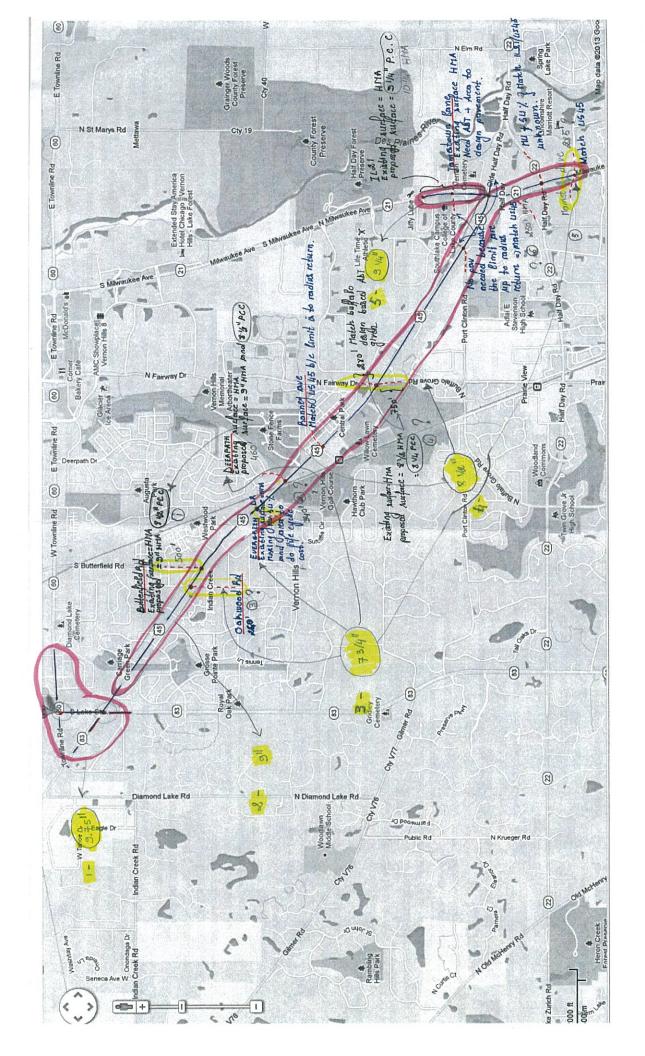
⁵ Designer Note 5: Use pay item #42000216, "PORTLAND CEMENT CONCRETE PAVEMENT 7 ¾" (JOINTED)" paid for in square yards.

⁶ Designer Note 6: Use pay item #42000311, "PORTLAND CEMENT CONCRETE PAVEMENT 8 ½" (JOINTED)" paid for in square yards.

⁷ Designer Note 7: Use pay item #42000411, "PORTLAND CEMENT CONCRETE PAVEMENT 9 1/4" (JOINTED)" paid for in square yards.

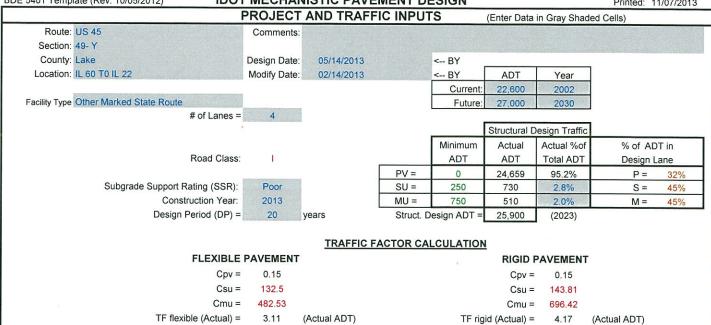
If you have any questions or need additional information, please contact Jenpai Chang, Interim Pavement Engineer, at (847) 705-4432.

By: José A. Dominguez, F.E. Project Support Engineer



Printed: 11/07/2013

(Min ADT Fig. 54-2.C)



	Full-De	pth HMA Pa	vement	JPC Pavement			
	Use TF flexible = PG Grade Lower Binder Lifts =	3.56 PG 64-22	(Fig. 53-4.R)	Use TF rigid = Edge Support =	5.02 Tied	Shoulder or C.&G.	
Goto Map Des	HMA Mixture Temp. = sign HMA Mixture Modulus (E _{HMA}) =	73.0 760	deg. F (Fig. 54-5.C) ksi (Fig. 54-5.D)	Rigid Pavt Thick. =	9.00	in. (Fig. 54-4.E)	
	Design HMA Strain (ϵ_{HMA}) =	84	(Fig. 54-5.E)	C	CRC Pave	ement	
Goto Man	ull Depth HMA Design Thickness = imiting Strain Criterion Thickness =	9.75 14.25	in. (Fig. 54-5.F) in. (Fig. 54-5.I)	Use TF rigid = IBR value =	5.02 2		
ALCOHOLD STATE	Use Full-Depth HMA Thickness =	9.75	inches	CRCP Thickness =	8.25	in. (Fig. 54-4.M)	
				TF MUST B	BE > 60	FOR CRCP	

(Min ADT Fig. 54-2.C)

RECONSTRUCTION OF	RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS								
HMA Ove	rlay of Rub	Unbonded Concrete Overlay							
Use TF flexible =	3.56		Review 54-4.03 for limitations and						
District =	3,4,5,6		special considerations.						
HMA Overlay Design Thickness =	8.00	in. (Fig. 54-5.U)	JPCP Thickness = NA inches						

CONTACT BMPR FOR ASSISTANCE

5.02

TF rigid (Min) =

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more	2 lanes with ADT > 2000	2 Lanes	2 Lanes
Part of a future 4 lanes or more One-way Streets with ADT > 3500	One way Street with ADT <= 3500	(ADT 750 -2000)	(ADT < 750)

	Min. Str. D	g 54-2.C)	
Facility Type	PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

TF flexible (Min) =

3.56

	Traffic Factor ESAL Coefficients						
	Rigid (F	ig. 54-4.C)	Flexible (Fig. 54-5.B)				
Class	Csu	Cmu	Csu	Cmu			
发展了是一次的位置在全部的 ,所谓这种主要是不是有关的。	143.81	696.42	132.50	482.53			
II	135.78	567.21	112.06	385.44			
III	129.58	562.47	109.14	384.35			
IV	129.58	562.47	109.14	384.35			
			No. of Concession, Name of Street, or other party of the last of t	STATE OF THE PARTY			

Class I	able for
One-Wa	y Streets
ADT	Class
0 - 3500	II.
>3501	1

Class	Table for
2 or 3	3 lanes
(not futur	e 4 lane &
not one-v	way street)
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II.

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)							
		Rural		Urban				
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

BDE 5401 Template (Rev. 10/05/2012) Printed: 11/07/2013 LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION **FULL-DEPTH HMA PAVEMENT** Standard Design ROUTE SECTION COUNTY US 45 49- Y Lake LOCATION IL 60 TO IL 22 FACILITY TYPE INTERSTATE PROJECT LENGTH # OF CENTERLINES # OF LANES 21120 FT ==> 4.00 Miles 1 CL 4 LANES 2 EP # OF EDGES LANE WIDTH - AVERAGE 12 FT SHOULDER WIDTH 0 FT НМА Outside 0 FT PAVEMENT THICKNESS (FLEXIBLE) 11.00 IN 14.25 IN MAX SHOULDER THICKNESS
POLICY OVERLAY THICKNESS 8.00 IN Standard Design 3.75 IN USE 7.11 FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL 7.11 3.11 Read Me! HMA COST PER TON UNIT PRICE \$95.00 /TON HMA TOP BINDER \$90.00 /TON HMA LOWER BINDER \$85.00 /TON \$95.00 /TON HMA BINDER (LEVELING) HMA SHOULDER \$85.00 /TON

	THICKNESS	100%	QUANTITY	UNIT		UNIT PRICE		COST
MA PAVEMENT (FULL-DEPTH)	(11.00")		112,640	SQ YD		\$55.12	/SQ YD	\$6,208,791
MA SURFACE COURSE	(2.00")		112,640	SQ YD		\$9.94	/SQ YD	\$0
MA TOP BINDER COURSE	(2.25")		112,640				/SQ YD	\$0
MA LOWER BINDER COURSE	(6.75")		112,640	SQ YD	•	\$24.39	/SQ YD	\$0
MA SHOULDER	(8.00")		0	SQ YD	• 1	\$41.73	/SQ YD	\$0
JRB & GUTTER			0	LIN FT		\$30.00	/LIN FT	\$0
IBBASE GRAN MATL TY C (TONS)			352	TONS		\$25.00	/TON	\$8,800
PROVED SUBGRADE:	Aggregate		5,333	SQ YD	* 5	\$10.00	/ SQ YD	\$53,330
served For User Supplied Item			0	UNITS		\$0.00	/ UNITS	\$0
served For User Supplied Item			0	UNITS		\$0.00	/ UNITS	\$0
VEMENT REMOVAL			112,640	SQ YD		\$0.00	/ SQ YD	\$0
IOULDER REMOVAL			0	SQ YD		\$0.00	/ SQ YD	\$0

Note: * Denotes User Supplied Quantity	FLEXIBLE CONSTRUCTION INITIAL COST	\$6,270,921
	FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	\$63,940

MAINTENANCE COSTS: ITEM	THICKNESS	MATERIAL	UNIT COST	ſ
ROUTINE MAINTENANCE ACTIVITY	1		\$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	1 90009 Surface Mix	2.51 \$9.94	/SQ YD
HMA OVERLAY PVMT	(3.75")	1.0085	\$18.64	/SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$8.70	/ SQ YD
HMA BINDER MIX	(2.25")	Top Binder Mix	\$9.94	/ SQ YD
HMA OVERLAY SHLD (Year 3	(0) (1.75")	Shoulder Mix	\$8.70	/ SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	\$9.94	/ SQ YD
MILLING (2.00 IN)			\$2.50	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	\$90.83	/SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	\$89.71	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	\$90.83	/SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	2 99 \$89.71	/SQ YD
LONGITUDINAL SHOULDER JOINT	ROUT & SEAL		\$2.00	/ LIN FT
CENTERLINE JOINT ROUT & SEAL			\$2.00	/LIN FT

RANDOM / THERMAL CRACK ROUT & SEAL

(100% Rehab = 110.00' / Station / Lane)

\$2.00 /LINFT

PRESENT

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

MAINTENANCE COSTS	ITCM		0/	OLIANITITY	INIT	LINIT COST	COST	PRESENT
MAINTENANCE COSTS:	ITEM		%	QUANTITY U	JNII	UNIT COST	COST	WORTH
YEAR 5								
ILIU O	LONG SHLD JT R&S		100.00%	42,240 LI	INFT	\$2.00	\$84,480	
	CNTR LINE JOINT R&S		100.00%	21,120 LI		\$2.00	\$42,240	
	RNDM / THRM CRACK R&S		50.00%	46,464 LI	INFT	\$2.00	\$92,928	
	PD PVMT PATCH M&F SURF		0.10%	113 S	QYD	\$90.83	\$10,264	
		PWFn =	0.8626		PW=	0.8626	X \$229,912	\$198,324
YEAR 10			100.000/	40.040.11	INIET	00.00	604 400	
	LONG SHLD JT R&S CNTR LINE JOINT R&S		100.00%	42,240 LI 21,120 LI		\$2.00 \$2.00	\$84,480 \$42,240	
	RNDM / THRM CRACK R&S		50.00%	46,464 LI		\$2.00	\$92,928	
	PD PVMT PATCH M&F SURF		0.50%	563 S		\$90.83	\$51,137	
		PWFn =	0.7441		PW=	0.7441		\$201,489
YEAR 15	EAR AND WEST CONTRACTOR							
	MILL PVMT & SHLD 2.00"		100.00%	112,640 S		\$2.50	\$281,600	
	PD PVMT PATCH M&F ADD'L	2.00"	1.00%	1,126 S		\$90.83	\$102,275	
	HMA OVERLAY PVMT 2.00"		100.00%	112,640 S		\$9.94	\$1,119,642	
	HMA OVERLAY SHLD 2.00 "	DIAFF	100.00%	0 80	Q YD	\$9.94	\$0	#00F 0F0
		PWFn =	0.6419		PW=	0.6419	X \$1,503,517	\$965,050
YEAR 20					No. of Street, or other teams of the street, or other teams or other teams of the street, or other teams or other teams of the street, or other teams or oth			
ILAR 20	LONG SHLD JT R&S		100.00%	42,240 LI	INFT	\$2.00	\$84,480	
	CNTR LINE JOINT R&S		100.00%	21,120 LI		\$2.00	\$42,240	
	RNDM / THRM CRACK R&S		50.00%	46,464 LI		\$2.00	\$92,928	
	PD PVMT PATCH M&F SURF		0.10%	113 S		\$90.83	\$10,264	
		PWFn =	0.5537		PW=	0.5537	X \$229,912	\$127,297
YEAR 25								
	LONG SHLD JT R&S		100.00%	42,240 LI		\$2.00	\$84,480	
	CNTR LINE JOINT R&S		100.00%	21,120 LI		\$2.00 \$2.00	\$42,240	
	RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF		0.50%	46,464 LI 563 S		\$90.83	\$92,928 \$51,137	
	FDFVINIT FATCH MIXE SORE	PWFn =	0.4776	303 3	PW=	0.4776		\$129,328
	HMA_SD		0.4110			0.4770	χ ψ270,700	\$125,520
YEAR 30								
	MILL PVMT ONLY 2.00"		100.00%	112,640 S	QYD	\$2.50	\$281,600	
	PD PVMT PATCH M&F ADD'L	2.00"	2.00%	2,253 S	Q YD	\$90.83	\$204,640	
	PD SHLD PATCH M&F SURF	2.00"	1.00%		QYD	\$89.71	\$0	
	HMA OVERLAY PVMT 3.75 "		100.00%	112,640 S		\$18.64	\$2,099,328	
	HMA OVERLAY SHLD 1.75"	DIAE	100.00%	0 S	Q YD	\$8.70	\$0	04 005 000
		PWFn =	0.4120		PW=	0.4120	X \$2,585,568	\$1,065,220
YEAR 35					SON MUNICIPAL ST			
ILAK 33	LONG SHLD JT R&S		100.00%	42,240 LI	INFT	\$2.00	\$84,480	
	CNTR LINE JOINT R&S		100.00%	21,120 LI		\$2.00	\$42,240	
	RNDM / THRM CRACK R&S		50.00%	46,464 LI		\$2.00	\$92,928	
	PD PVMT PATCH M&F SURF		0.10%	113 S		\$90.83	\$10,264	
		PWFn =	0.3554		PW=	0.3554	X \$229,912	\$81,707
YEAR 40			100 000	10.010	11.55		001.100	
	LONG SHLD JT R&S		100.00%	42,240 LI		\$2.00	\$84,480	
	CNTR LINE JOINT R&S		100.00%	21,120 LI		\$2.00	\$42,240	
	RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF		50.00% 0.50%	46,464 LI 563 S		\$2.00 \$90.83	\$92,928 \$51,137	
	PD PVINI PATCH MAR SORF	PWFn =	0.3066	303 3	PW=	0.3066		\$83,011
			0.0000			0.0000	7 4210,100	000,011
								\$2,851,426
	ROUTINE MAINTENANCE ACT	TIVITY		16.00 L	ane Miles	0.00	\$0	\$0
							-CYCLE COST	\$2,851,426
45	YEAR LIFE CYCLE	CRFn = 0.040	7852	MAIN	NTENANO	CE ANNUAL CO	OST PER MILE	\$29,074

PCC PAVEMENT				JPCP
ROUTE SECTION COUNTY LOCATION		US 45 49- Y Lake IL 60 TO IL 22		
FACILITY TYPE		INTERSTATE		
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH PCC Inside PCC Outsid	е	21120 FT ==: 1 CL 4 LANES 2 EP 12 FT 0 FT 0 FT	> 4.00 Miles	
PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS	JPCP	10.00 IN 10.00 IN	TIED SHLD	
POLICY OVERLAY THICKNESS		3.75 IN		
RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
Worksheet Construction Type is New Constr	uction	10.05 The P	4.17 Pavement Type is	10.05 JPCP
INITIAL COSTS ITEM THICK	NESS 100	0% QUANTITY UNIT	UNIT PRICE	COST
PAVEMENT REINFORCEMENT	0.00") 4.50")	112,640 SQ YD 0 SQ YD 119,680 SQ YD	\$41.00 /SQYD \$0.00 /SQYD \$0.00 /SQYD	\$4,618,240 \$0 \$0
PCC SHOULDERS (10.00" to 10 CURB & GUTTER	0.00")	0 SQ YD 0 LIN FT	\$36.00 /SQYD \$30.00 /LIN FT	\$0 \$0
	0.00") regate Nation = 2.3	352 TONS 5,333 SQ YD	\$25.00 /TON \$10.00 /SQYD	\$8,800 \$53,330
Reserved For User Supplied Item Reserved For User Supplied Item		0 UNITS 0 UNITS	\$0.00 /UNITS \$0.00 /UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL		112,640 SQ YD 0 SQ YD	\$0.00 /SQYD \$0.00 /SQYD	\$0 \$0
Note: * Denotes User Supplied Quantity	RIGID CO	RIGID CONSTRUCTION ANNUAL		\$4,680,370 \$47,722
MAINTENANCE COSTS:				
ITEM THICK	NESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			\$0.00 / LANE-MI	LE / YEAR
	3.75") 3.75")	8.79	\$18.64 /SQ YD	
	1.50")	Surface Mix 1.56	\$7.46 /SQYD	
	2.25") 1.6591	Top Binder Mix Shoulder Mix	\$11.18 /SQYD	
HIMA POLICI OVERLAT SHLD	3.75")	Shoulder Mix 375	\$18.64 / SQ YD	
CLASS A PAVEMENT PATCHING			\$170.00 /SQYD	
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING			\$130.00 / SQ YD \$110.00 / SQ YD	
PARTIAL DEPTH PVMT PATCH (Mill & Fill HM PARTIAL DEPTH PVMT PATCH (Mill & Fill HM		Surface Mix Surface Mix	\$88.17 / SQ YD \$88.17 / SQ YD	
LONGITUDINAL SHOULDER JOINT ROUT & S	EAL		\$2.00 / LIN FT	
CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & S	SFAI		\$2.00 / LIN FT \$2.00 / LIN FT	
	100% Rehab = 100.00	0' / Station / Lane)	\$2.00 /LIN FT	
Brand of the control				

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY UNIT	UNIT COST	COST	PRESEN WORT
VEAD 46						
YEAR 10	PAVEMENT PATCH CLASS B	0.10%	113 SQ YD	\$130.00	614 600	
	PWFn =	0.7441	113 SQ 1D		\$14,690 X \$14,690	640.02
	PVVFII =	0.7441	PVV =	0.7441	X \$14,690	\$10,93
YEAR 15						
	PAVEMENT PATCH CLASS B	0.20%	225 SQ YD	\$130.00	\$29,250	
	PWFn =	0.6419	PW=	0.6419	X \$29,250	\$18,77
YEAR 20						
	PAVEMENT PATCH CLASS B	2.00%	2,253 SQ YD	\$130.00	\$292,890	
	SHOULDER PATCH CLASS C	0.50%	0 SQ YD	\$110.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	42.240 LIN FT	\$2.00	\$84,480	
	CENTERLINE JT R&S	100.00%	21,120 LIN FT	\$2.00	\$42,240	
	PWFn =	0.5537	PW=	0.5537		\$232,32
VEAD OF						
YEAR 25	PAVEMENT PATCH CLASS B	3.00%	3,379 SQ YD	\$130.00	\$439,270	
	SHOULDER PATCH CLASS C	1.00%	0 SQ YD	\$110.00	\$0	
	PWFn =	0.4776	PW=			\$209,79
YEAR 30		4.000/	4.500.00.VD	0400.00	0505 700	
	PAVEMENT PATCH CLASS B	4.00%	4,506 SQ YD	\$130.00	\$585,780	
	SHOULDER PATCH CLASS C	1.50%	0 SQ YD	\$110.00	\$0	
	HMA POLICY OVERLAY 3.75" (PVMT)	100.00%	112,640 SQ YD	\$18.64	\$2,099,328	
	HMA POLICY OVERLAY 3.75" (SHLD) PWFn =	0.4120	0 SQ YD PW=	\$18.64 0.4120	X \$2,685,108	\$1,106,22
YEAR 35						
	LONGITUDINAL SHLD JT R&S	100.00%	42,240 LIN FT	\$2.00	\$84,480	
	CENTERLINE JT R&S	100.00%	21,120 LIN FT	\$2.00	\$42,240	
	RANDOM CRACK R&S	50.00%	42,240 LIN FT	\$2.00	\$84,480	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	27,034 LIN FT	\$2.00	\$54,068	
	PD PVMT PATCH M&F HMA SURF 1.50" PWFn =	0.10%	113 SQ YD PW =	\$88.17 0.3554	\$9,963 X \$275,231	607.0
	F VVFII -	0,3334	PVV -	0.3554	A \$275,231	\$97,81
YEAR 40						
	PAVEMENT PATCH CLASS B	0.50%	563 SQ YD	\$130.00	\$73,190	
	LONGITUDINAL SHLD JT R&S	100.00%	42,240 LIN FT	\$2.00	\$84,480	
	CENTERLINE JT R&S	100.00%	21,120 LIN FT	\$2.00	\$42,240	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	40,550 LIN FT	\$2.00	\$81,100	
	RANDOM CRACK R&S	50.00%	42,240 LIN FT	\$2.00	\$84,480	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.50%	563 SQ YD	\$88.17	\$49,640	
	PWFn =	0.3066	PW=	0.3066	X \$415,130	\$127,26
						\$1,803,13
	ROUTINE MAINTENANCE ACTIVITY		16.00 Lane Mile	\$ \$0.00	\$0	\$
			MAIN	TENANCE LIFE	-CYCLE COST	\$1,803,13
45	YEAR LIFE CYCLE CRFn = 0.040	7852	MAINTENAN	CE ANNUAL C	OST PER MILE	\$18,38

			JPCP	HMA	
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$4,680,370	\$6,270,921	
		ANNUAL COST PER MILE	\$47,722	\$63,940	
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$1,803,134	\$2,851,426	
		ANNUAL COST PER MILE	\$18,385	\$29,074	
OTAL	LIFE-CYCLE COST	PRESENT WORTH	\$6,483,504	\$9,122,347	
		ANNUAL COST PER MILE	\$66,108	\$93,014	
_IFE-CYCL			\$66,108	THE PROPERTY OF THE PARTY OF TH	
LIFE-CYCL	E COST ANALYSIS	ANNUAL COST PER MILE	\$66,108 JPCP	THE PROPERTY OF THE PARTY OF TH	

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells) Route: IL 60 Comments: Section: 49-Y County: Lake Design Date: 05/10/2013 CI <-- BY Location: US 45 Modify Date: <-- BY ADT Year Current: 38,081 2002 Facility Type Other Marked State Route 53,000 Future: 2030 # of Lanes = 4 Structural Design Traffic Minimum Actual Actual %of % of ADT in Road Class: ADT ADT Total ADT Design Lane PV = 47,102 95.6% P= 32% Subgrade Support Rating (SSR): Poor SU = 250 1,045 2.1% S= 45% Construction Year: 2013 MU = 750 1,123 2.3% M = 45% Design Period (DP) = 49,270 20 Struct. Design ADT = years (2023)TRAFFIC FACTOR CALCULATION **FLEXIBLE PAVEMENT** RIGID PAVEMENT Cpv = 0.15 Cpv = 0.15 Csu = 132.5 Csu = 143.81 Cmu = 482.53 Cmu = 696.42 TF flexible (Actual) = 6.17 (Actual ADT) TF rigid (Actual) = 8.44 (Actual ADT) TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C) TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

	Full-De	pth HMA Pa	vement	JP	C Pavem	ent
	Use TF flexible =	6.17		Use TF rigid =	8.44	
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.
Goto Map	HMA Mixture Temp. =	74.5	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	9.75	in. (Fig. 54-4.E)
De	esign HMA Mixture Modulus (E _{HMA}) =	710	ksi (Fig. 54-5.D)			
	Design HMA Strain (ε_{HMA}) =	72	(Fig. 54-5.E)	(RC Pave	ement
	Full Depth HMA Design Thickness =	11.00	in. (Fig. 54-5.F)	Use TF rigid =	8.44	
Goto Map	Limiting Strain Criterion Thickness =	14.75	in. (Fig. 54-5.I)	IBR value =	2	
	Use Full-Depth HMA Thickness =	11.00	inches	CRCP Thickness =	8.75	in. (Fig. 54-4.M)
				TF MUST E	BE > 60	FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEN	ENT DESIGN CALCULATIONS
HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 6.17	Review 54-4.03 for limitations and
District = 3,4,5,6	special considerations.
HMA Overlay Design Thickness = 9.25 in. (Fig. 54-5.U)	JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

Class I Roads		Class II Roads		С	lass III Roa	ds	Class IV F	Roa
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500		nes with ADT > 2 Street with ADT		(A	2 Lanes DT 750 -20	00)	2 Lane (ADT < 7	es
	Min. Str.	Design Traffic (Fi	g 54-2.C)	Ī		Class T	able for	
Facility Type	PV	SU	MU	1		One-Wa	y Streets	
Interstate or Supplemental Freeway	0	500	1500	1		ADT	Class	
Other Marked State Route	0	250	750			0 - 3500	II	
Unmarked State Route	No Min	No Min	No Min			>3501		
Class	Csu 143.81	Fig. 54-4.C) Cmu 696.42	Csu 132.50	Fig. 54-5.B) Cmu 482.53		(not future	lanes e 4 lane & vay street)	
II	135.78	567.21	112.06	385.44		ADT	Class	
III	129.58	562.47	109.14	384.35		0 - 749	IV	
IV	129.58	562.47	109.14	384.35		750 - 2000	III	
						>2000	II	
ı	Design La	ane Distribution F	actors For Str	ictural Design	Traffic (Fig	1 54-2 B)		
	200.9.1.2.	Rural		Jotalai Dooigi	Urban	3. 0 (2.5)		
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4 Marie Company	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

BDE 5401 Template (Rev. 10/05/2012) Printed: 11/07/2013

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

Standard Design

FULL-DEPTH HMA PAVEMENT				S
ROUTE SECTION COUNTY LOCATION		Job Route Job Section Job County Job Location		
FACILITY TYPE		NON-INTERSTATE		
	side utside	1000 FT ==> 2 CL 4 LANES 4 EP 12 FT 6 FT 10 FT	0.19 Miles	
PAVEMENT THICKNESS (FLEXIBLE) SHOULDER THICKNESS POLICY OVERLAY THICKNESS		12.00 IN 12.00 IN 2.25 IN	17.00 IN MAX Standar	: rd Design
FLEX PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		7.11	1.00	7.11
HMA COST PER TON HMA SURFACE HMA TOP BINDER HMA LOWER BINDER HMA BINDER (LEVELING) HMA SHOULDER			UNIT PRICE \$95.00 /TON \$90.00 /TON \$85.00 /TON \$95.00 /TON \$85.00 /TON	Read Mel
INITIAL COSTS ITEM TH	HICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(12.00")	5,333 SQ YD	\$61.27 /SQYD	\$326,781
HMA SURFACE COURSE	(2.00")	5,333 SQ YD	\$10.71 /SQYD	\$0
HMA TOP BINDER COURSE HMA LOWER BINDER COURSE	(2.25") (7.75")	5,333 SQ YD 5,333 SQ YD	\$11.59 /SQYD \$38.97 /SQYD	\$0 \$0
LIMA CHOULDED	(40.000)			
HMA SHOULDER CURB & GUTTER	(12.00")	3,556 SQ YD * 0 LIN FT	\$41.73 / SQ YD \$30.00 / LIN FT	\$148,373 \$0
SUBBASE GRAN MATL TY C (TONS) IMPROVED SUBGRADE:	Aggregate	0 TONS 5,333 SQ YD	\$25.00 /TON \$10.00 /SQ YD	\$0 \$53,330
Reserved For User Supplied Item Reserved For User Supplied Item		0 UNITS	\$0.00 /UNITS \$0.00 /UNITS	\$0 \$0
PAVEMENT REMOVAL		5,333 SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		3,556 SQ YD	\$0.00 /SQYD	\$0
Note: * Denotes User Supplied Quantity	FLEXII	FLEXIBLE CONSTRUCTION BLE CONSTRUCTION ANNUAL C		\$528,484 \$113,807
MAINTENANCE COSTS:	HICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MIL	E/YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix 256	\$10.00 / SQ YD	
HMA OVERLAY PVMT HMA SURFACE MIX	(2.25")	LUNCE Surface Mix 1.56	\$11.25 /SQ YD \$7.50 /SQ YD	
HMA BINDER MIX HMA OVERLAY SHLD (Year 30)	(0.75")	eling Binder Mix	\$3.75 / SQ YD	
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix Shoulder Mix	\$10.00 /SQYD	
MILLING (2.00 IN)			\$2.50 / SQ YD	
	ll & Fill Surf) ll & Fill Surf)	Surface Mix 5/89/ Shoulder Mix 5/89	\$90.83 /SQ YD \$89.71 /SQ YD	
	Fill +2.00 ") Fill +2.00 ")	Leveling Binder Mix Shoulder Mix	\$90.83 /SQYD \$89.71 /SQYD	
LONGITUDINAL SHOULDER JOINT ROUT	& SEAL		\$2.00 /LINFT	
CENTERLINE JOINT ROUT & SEAL		0% Pahah = 110 001/ Station / Louis	\$2.00 / LIN FT	
RANDOM / THERMAL CRACK ROUT & SE	.nl (10	0% Rehab = 110.00' / Station / Lane)	\$2.00 /LINFT	

PRESENT WORTH

COST

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7 C

		STANDARD DES		
MAINTENANCE COSTS:	ITEM	%	QUANTITY UNIT	UNIT CO
YEAR 5				
	LONG SHLD JT R&S	100.00%	4,000 LIN FT	\$2
	CNTR LINE JOINT R&S	100.00%	2,000 LIN FT	\$2
	DNDM / THOM CDACK DOC	FO 000/	0.000 LINIET	-

YEAR 5	LONG SHLD JT R&S	100.00%	4 000	LINFT	\$2.00	\$8.000	
	CNTR LINE JOINT R&S	100.00%		LINFT	\$2.00	\$4,000	
	RNDM / THRM CRACK R&S	50.00%		LINFT	\$2.00	A STATE OF THE PARTY OF THE PAR	
	PD PVMT PATCH M&F SURF	0.10%		SQ YD	\$90.83	\$4,400	
	PWFn =		5	PW=	0.8626 X	\$454 \$16,854	\$
VE 15 10							
YEAR 10	LONG SHLD JT R&S	100.00%	4 000	LINFT	\$2.00	\$8,000	
	CNTR LINE JOINT R&S	100.00%		LINFT	\$2.00	\$4,000	
	RNDM / THRM CRACK R&S	50.00%		LINFT	\$2.00		
	PD PVMT PATCH M&F SURF	0.50%	THE RESERVE OF THE PERSON NAMED IN	SQ YD	\$90.83	\$4,400	
	PWFn =		21	PW=	0.7441 X	\$2,452 \$18,852	\$
YEAR 15							
TEAR 15	MILL PVMT & SHLD 2.00"	100.00%	8.889	SQ YD	\$2.50	\$22,223	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	53	SQ YD	\$90.83	\$4,814	
	HMA OVERLAY PVMT 2.00"	100.00%		SQ YD	\$10.00	\$53,333	
	HMA OVERLAY SHLD 2.00 "	100.00%		SQYD	\$10.00	\$35,556	
	PWFn =			PW=	0.6419 X		\$
YEAR 20							
	LONG SHLD JT R&S	100.00%	4,000	LINFT	\$2.00	\$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LINFT	\$2.00	\$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LINFT	\$2.00	\$4,400	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$90.83	\$454	
	PWFn =	0.5537		PW=	0.5537 X	\$16,854	
YEAR 25							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	\$2.00	\$4,400	
	PD PVMT PATCH M&F SURF	0.50%	27	SQ YD	\$90.83	\$2,452	
	PWFn =	0.4776		PW=	0.4776 X	\$18,852	
YEAR 30	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	8.889	SQ YD	\$2.50	\$22,223	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%		SQ YD	\$90.83	\$9,719	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	36	SQ YD	\$89.71	\$3,230	
	HMA OVERLAY PVMT 2.25 "	100.00%	5,333	SQ YD	\$11.25	\$60,000	
	HMA OVERLAY SHLD 2.25 "	100.00%		SQ YD	\$11.25	\$40,000	
	PWFn =	0.4120		PW=	0.4120 X	\$135,172	\$
YEAR 35							
	LONG SHLD JT R&S	100.00%		LIN FT	\$2.00	\$8,000	
	CNTR LINE JOINT R&S	100.00%	Company of the Compan	LIN FT	\$2.00	\$4,000	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$4,400	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$90.83	\$454	
	PWFn =	0.3554		PW=	0.3554 X	\$16,854	
YEAR 40		400 000					
	LONG SHLD JT R&S	100.00%	THE SHAPE OF THE	LIN FT	\$2.00	\$8,000	
	CNTR LINE JOINT R&S	100.00%	The State of the S	LIN FT	\$2.00	\$4,000	
	RNDM / THRM CRACK R&S	50.00%		LINFT	\$2.00	\$4,400	
	PD PVMT PATCH M&F SURF	0.50%	27	SQ YD PW=	\$90.83 0.3066 X	\$2,452	
	PWFn =					\$18,852	

\$188,768

\$0 \$188,768 \$40,650 .76 Lane Miles 0.00 \$0

MAINTENANCE LIFE-CYCLE COST
MAINTENANCE ANNUAL COST PER MILE ROUTINE MAINTENANCE ACTIVITY 0.76 Lane Miles 45 YEAR LIFE CYCLE CRFn = 0.0407852

			Marine Marine Marine
PCC PAVEMENT			JPCP
ROUTE	Job Route		
SECTION	Job Section		
COUNTY	Job County		
LOCATION	Job Location		
FACILITY TYPE	NON-INTERSTATE		
PROJECT LENGTH	1000 FT	==> 0.19 Miles	
# OF CENTERLINES	2 CL		
# OF LANES	4 LANI	ES	
# OF EDGES LANE WIDTH - AVERAGE	4 EP 12 FT		
SHOULDER WIDTH PCC Inside	6 FT		
PCC Outside	10 FT		
PAVEMENT THICKNESS (RIGID)	JPCP 10.00 IN	TIED SHLD	
SHOULDER THICKNESS	10.00 IN		
POLICY OVERLAY THICKNESS	2.50 IN		
RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
Worksheet Construction Type is New Construction	10.05 T	he Pavement Type is	JPCP
INITIAL COSTS			
ITEM THICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
JPC PAVEMENT (10.00")	5,333 SQ YI		\$266,650
PAVEMENT REINFORCEMENT STABILIZED SUBBASE (4.50")	0 SQ YI 6,000 SQ YI		\$0 \$0
PCC SHOULDERS (10.00" to 10.00") CURB & GUTTER	3,556 SQ YI 0 LIN F		\$160,020 \$0
SUBBASE GRAN MATL TY C IMPROVED SUBGRADE: Aggregate	0 TONS 5,333 SQ Y		\$0 \$53,330
Reserved For User Supplied Item	0 UNIT	\$0.00 /UNITS	\$0
Reserved For User Supplied Item	0 UNIT	\$0.00 /UNITS	\$0
PAVEMENT REMOVAL	5,333 SQ Y		\$0
SHOULDER REMOVAL	3,556 SQ Y	\$0.00 /SQYD	\$0
Note: * Denotes User Supplied Quantity	RIGID CONSTRU RIGID CONSTRUCTION ANN	CTION INITIAL COST	\$480,000 \$103,366
MAINTENANCE COSTS: ITEM THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY		\$0.00 / LANE-MII	E/YEAR
HMA POLICY OVERLAY (2.50")		50	
HMA POLICY OVERLAY PVMT (2.50")		\$12.50 / SQ YD	
HMA SURFACE MIX (1.50")		\$7.50 /SQYD	
HMA BINDER MIX (1.00")	<u> </u>	\$5.00 /SQYD	
HMA POLICY OVERLAY SHLD (2.50")	Shoulder Mix	\$12.50 / SQ YD	
CLASS A PAVEMENT PATCHING		\$170.00 /SQ YD	
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING		\$130.00 /SQ YD \$110.00 /SQ YD	
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf	Surface Mix	\$88.17 /SQYD	
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50		\$93.49 /SQYD	
LONGITUDINAL SHOULDER JOINT ROUT & SEAL		\$2.00 /LIN FT	
CENTERLINE JOINT ROUT & SEAL		\$2.00 / LIN FT	
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL		\$2.00 / LIN FT	
RANDOM CRACK ROUT & SEAL (100% Re	ehab = 100.00' / Station / Lane)	\$2.00 / LIN FT	

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

W = 0.7441 X \$650 \$4844 D \$130.00 \$1,430 \$918 W = 0.6419 X \$1,430 \$918 D \$130.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 D \$110.00 \$3,960 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4720 X \$144,632 \$59,586 T \$2.00 \$8,000 T \$2.00 \$6,800 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$6	PRESENT WORTH	COST		JNIT COST	UNIT L	QUANTITY	%	EM	MAINTENANCE COSTS:
W = 0.7441 X \$650 \$484 D \$130.00 \$1,430 W = 0.6419 X \$1,430 \$918 D \$130.00 \$13,910 D \$110.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 D \$130.00 \$22,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$5,830 D \$110.00 \$5,830 D \$110.00 \$5,830 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000									YEAR 10
W = 0.7441 X \$650 \$484 D \$130.00 \$1,430 W = 0.6419 X \$1,430 \$918 D \$130.00 \$13,910 D \$110.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 T \$2.00 \$4,000 T \$2.00 \$4,0		\$650		\$130.00	SQ YD	5	0.10%	AVEMENT PATCH CLASS B	
W = 0.6419 X \$1,430 \$918 D \$130.00 \$13,910 D \$110.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$4,00	\$484		Х		PW=		0.7441	PWFn =	
W = 0.6419 X \$1,430 \$918 D \$130.00 \$13,910 D \$110.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 \$15,442 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,49 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$									YEAR 15
D \$130.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 S110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,49 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$4,000 T		\$1,430		\$130.00	SQ YD	11	0.20%	AVEMENT PATCH CLASS B	
D \$110.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 \$15,442 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$	\$918	\$1,430	X	0.6419	PW=		0.6419	PWFn =	
D \$110.00 \$1,980 T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 \$15,442 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$									YEAR 20
T \$2.00 \$8,000 T \$2.00 \$4,000 W = 0.5537 X \$27,890 \$15,442 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.		\$13,910		\$130.00	SQ YD	107	2.00%	AVEMENT PATCH CLASS B	
T \$2.00 \$4,000 W = 0.5537 X \$27,890 \$15,442 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$		\$1,980		\$110.00	SQ YD	18	0.50%	HOULDER PATCH CLASS C	
W = 0.5537 X \$27,890 \$15,442 D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$11.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,510 T \$2.00 \$4,000 T \$2.0		\$8,000		\$2.00	LIN FT	4,000	100.00%	ONGITUDINAL SHLD JT R&S	
D \$130.00 \$20,800 D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$112.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$4,600 T \$2.00 \$4,600 T \$2.00 \$4,600 T \$2.00 \$4,600 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894		\$4,000	4	\$2.00	LIN FT	2,000	100.00%	ENTERLINE JT R&S	
D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$3,600 T \$2.00 \$4,000 T \$2.00 \$3,600 T \$2.00 \$4,000 T \$2.0	\$15,442	\$27,890	X	0.5537	PW=		0.5537	PWFn =	
D \$110.00 \$3,960 W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.0									YEAR 25
W = 0.4776 X \$24,760 \$11,826 D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$4,		THE CARLES AND SERVICE STATES			SQ YD		3.00%	AVEMENT PATCH CLASS B	
D \$130.00 \$27,690 D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894					SQ YD	36	1.00%	HOULDER PATCH CLASS C	
D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$130,00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894	\$11,826	\$24,760	X	0.4776	PW=		0.4776	PWFn =	
D \$110.00 \$5,830 D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$8,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938								NON-INTERSTATE	YEAR 30
D \$12.50 \$66,667 D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,600 T \$2.00 \$4,600 T \$2.00 \$4,600 T \$2.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$4,					SQ YD		4.00%	AVEMENT PATCH CLASS B	
D \$12.50 \$44,445 W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894		Continue State Contin			SQ YD		1.50%	HOULDER PATCH CLASS C	
W = 0.4120 X \$144,632 \$59,586 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$8,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938					SQ YD		100.00%	MA POLICY OVERLAY 2.5" (PVMT)	
T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938	\$59,586		X		SQ YD PW =	3,556	0.4120	MA POLICY OVERLAY 2.5" (SHLD) PWFn =	
T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938								NON-INTERSTATE	YEAR 35
T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938		\$8,000		\$2.00	LIN FT	4 000	100.00%	ONGITUDINAL SHLD JT R&S	I LAN 30
T \$2.00 \$4,000 T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$4,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938		THE R. P. LEWIS CO., LANSING, MICH.			LIN FT	THE RESERVE OF THE PARTY OF THE	100.00%	ENTERLINE JT R&S	
T \$2.00 \$2,572 D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938		THE RESERVE THE PROPERTY OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO I			LINFT	A TOTAL OF THE PARTY OF THE PAR	50.00%	ANDOM CRACK R&S	
D \$93.49 \$467 W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938					LINFT		40.00%	EFLECTIVE TRANSVERSE CRACK R&S	
W = 0.3554 X \$19,039 \$6,766 D \$130.00 \$3,510 T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938		\$467		\$93.49	SQ YD	5	0.10%	D PVMT PATCH M&F HMA 2.50"	
T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938	\$6,766	\$19,039	X	0.3554	PW=		0.3554	PWFn =	
T \$2.00 \$8,000 T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938								NON-INTERSTATE	YEAR 40
T \$2.00 \$4,000 T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938				\$130.00	SQ YD	27	0.50%	AVEMENT PATCH CLASS B	
T \$2.00 \$3,860 T \$2.00 \$4,000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938		\$8,000		\$2.00	LIN FT	4,000	100.00%	ONGITUDINAL SHLD JT R&S	
T \$2.00 \$4.000 D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938		THE RESIDENCE AND ADDRESS OF THE PARTY OF TH			LIN FT	The second secon	100.00%	ENTERLINE JT R&S	
D \$93.49 \$2,524 W = 0.3066 X \$25,894 \$7,938		THE RESERVE OF THE PARTY OF THE			LINFT	The second secon	60.00%	EFLECTIVE TRANSVERSE CRACK R&S	
W = 0.3066 X \$25,894 \$7,938					LIN FT		50.00%	ANDOM CRACK R&S	
		THE RESERVE OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TW			SQ YD	27	0.50%	D PVMT PATCH M&F HMA 2.50"	
		\$25,894	X	0.3066	PW=		0.3066	PWFn =	
Miles \$0.00 \$0 \$0		40		\$0.00	Lane Miles	0.76		OUTINE MAINTENANCE ACTIVITY	
AINTENANCE LIFE-CYCLE COST \$102,960			-CY			0.70		COTHE MAINTENANCE ACTIVITY	
NANCE ANNUAL COST PER MILE \$22,172						MA	7852	'EAR LIFE CYCLE CRFn = 0.040	45

			JPCP	HMA	
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$480,000	\$528,484	
		ANNUAL COST PER MILE	\$103,366	\$113,807	
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$102,960	\$188,768	
		ANNUAL COST PER MILE	\$22,172	\$40,650	
OTAL	LIFE-CYCLE COST	PRESENT WORTH	\$582,960	\$717,252	
		ANNUAL COST PER MILE	\$125,538	\$154,457	
LIFE-CYCL	E COST ANALYSIS	S: FINAL SUMMARY			
LIFE-CYCL		S: FINAL SUMMARY	JPCP	\$125,538	
LIFE-CYCL	F COST ANALYSIS	S. FINAL SLIMMARY			

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells) Route: IL 83 Comments: Section: 49-Y County: Lake Design Date: 05/14/2013 <-- BY Location: 100ft South Of Osage Rd to US 45 Modify Date: 05/14/2013 <-- BY Year Current: 33,020 2002 Facility Type Other Marked State Route Future 38,000 2030 4 # of Lanes = Structural Design Traffic Minimum Actual Actual %of % of ADT in Road Class: 1 ADT ADT Total ADT Design Lane PV = 35,039 95.3% P= Subgrade Support Rating (SSR): Poor SU = 250 735 2.0% S= 45% Construction Year: 2013 MU = 750 981 2.7% M = 45% Design Period (DP) = 36,755 20 Struct. Design ADT = (2023)TRAFFIC FACTOR CALCULATION FLEXIBLE PAVEMENT RIGID PAVEMENT Cpv = 0.15 Cpv = 0.15 Csu = 132.5 Csu = 143.81 Cmu = 482.53 Cmu = 696.42 TF flexible (Actual) = 5.17 (Actual ADT) TF rigid (Actual) = 7.14 (Actual ADT) TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C) TF rigid (Min) = (Min ADT Fig. 54-2.C) 5.02

	Full-De	JP	C Pavem	ent		
	Use TF flexible =	5.17		Use TF rigid =	7.14	
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.
Goto Map	HMA Mixture Temp. =	73.0	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	9.50	in. (Fig. 54-4.E)
Des	sign HMA Mixture Modulus (E _{HMA}) =	760	ksi (Fig. 54-5.D)			
	Design HMA Strain (ϵ_{HMA}) =	75	(Fig. 54-5.E)		CRC Pave	ement
F	ull Depth HMA Design Thickness =	10.50	in. (Fig. 54-5.F)	Use TF rigid =	7.14	
Goto Map	imiting Strain Criterion Thickness =	14.25	in. (Fig. 54-5.I)	IBR value =	2	
	Use Full-Depth HMA Thickness =	10.50	inches	CRCP Thickness =	8.75	in. (Fig. 54-4.M)
				TF MUST E	3E > 60	FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS								
HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay							
Use TF flexible = 5.17	Review 54-4.03 for limitations and							
District = 3,4,5,6	special considerations.							
HMA Overlay Design Thickness = 8.75 in. (Fig. 54-5.U)	JPCP Thickness = NA inches							

Class I Roads		Class II Roads		C	ass III Roa	ds I	Class I\	/ Roa
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500		nes with ADT > 20 Street with ADT	7.77.7		2 Lanes DT 750 -200		2 La (ADT ·	nes
	Min. Str. I	Design Traffic (Fig	54-2.C)			Class T	able for	1
Facility Type	PV	SU	MU			One-Wa	y Streets	
Interstate or Supplemental Freeway	0	500	1500			ADT	Class	1
Other Marked State Route	0	250	750			0 - 3500	II	1
Unmarked State Route	No Min	No Min	No Min			>3501	1	
Class	Csu 143.81 135.78	Cmu 696.42 567.21	Csu 132.50 112.06	Cmu 482.53 385.44			e 4 lane & vay street) Class	
iii	129.58	562.47	109.14	384.35		0 - 749	IV	1
l iv	129.58	562.47	109.14	384.35		750 - 2000	111	l
						>2000	II	
-	Design La	ne Distribution F	actors For Stru	uctural Design	Traffic (Fig	ı. 54-2.B)		
		Rural			Urban			
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

BDE 5401 Template (Rev. 10/05/2012)

Printed: 11/07/2013 LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

tandard Design

FULL-DEPTH HMA PAVEME	<u>NT</u>					S
ROUTE SECTION COUNTY		IL 83 49-Y Lake				
LOCATION	100ft Sou	th Of Osage Rd to US 45				
FACILITY TYPE		INTERSTATE				
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH HMA	Inside Outside	1 4 2 12 0	FT == CL LANES EP FT FT	> 0.13	Miles	
PAVEMENT THICKNESS (FLEXIBLE) SHOULDER THICKNESS POLICY OVERLAY THICKNESS		11.00 8.00 3.75	IN	14.25	IN MAX Standar	d Design
FLEX PAVEMENT TRAFFIC FACTOR	RS	MINIMUM		ACTUAL		USE
		7.11		5.17		7.11
						Read Me!
HMA COST PER TON HMA SURFACE				UNIT PRICE \$95.00		
HMA TOP BINDER HMA LOWER BINDER HMA BINDER (LEVELING) HMA SHOULDER				\$90.00 \$85.00 \$95.00 \$85.00	/TON /TON /TON	
INITIAL COSTS ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
HMA PAVEMENT (FULL-DEPTH)	(11.00")	3,627	SO VD	\$55.12	/SQ YD	\$199,904 ~
HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COURSE	(2.00") (2.25") (6.75")	3,627 3,627 3,627	SQ YD	\$10.37	/SQ YD /SQ YD /SQ YD	\$0 \$0 \$0
HMA SHOULDER	(8.00")	0	SQ YD	. 641.72	/ SQ YD	\$0 ~
CURB & GUTTER	(0.00)		LIN FT		/LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS) IMPROVED SUBGRADE:	Aggregate	11 : 5,333 :	TONS SQ YD	\$25.00 \$10.00	/TON /SQ YD	\$275 \$53,330
Reserved For User Supplied Item Reserved For User Supplied Item			UNITS UNITS		/UNITS /UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL		3,627	SQ YD SQ YD		/ SQ YD	\$0 \$0
Note: * Denotes User Supplied Quantity		FLEXIBLE CONS	TRUCTIO	ON INITIAL COST		\$253,509 \$80,282
MAINTENANCE COSTS:	THICKNESS	MATERIAL		UNIT COST		
ROUTINE MAINTENANCE ACTIVITY	7110111200				LANE-MIL	E/YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix		\$10.86	/ SQ YD	
HMA OVERLAY PVMT HMA SURFACE MIX	(3.75")	Surface Mix	8 77 1 36		/SQ YD	
HMA BINDER MIX	(2.25")	1 Bliffs Top Binder Mix	2.20	\$10.86	/SQ YD	
HMA OVERLAY SHLD (Year 30) HMA OVERLAY SHLD	(1.75") (2.00")	Shoulder Mix Shoulder Mix			/SQ YD	
MILLING (2.00 IN)				\$2.50	/SQ YD	
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf) (Mill & Fill Surf)	Surface Mix Shoulder Mix			/SQ YD /SQ YD	
PARTIAL DEPTH PVMT PATCH (M	lill & Fill +2.00 ") lill & Fill +2.00 ")	Leveling Binder Mix Shoulder Mix		\$90.83	/SQYD	
PARTIAL DEL TIT GILLD PATOTI						
LONGITUDINAL SHOULDER JOINT RO	UT & SEAL			\$2.00	/ LIN FT	

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

WO	COST	OST	UNIT COS	UNIT	QC/ II TITT			ITEM	
									YEAR 5
	\$2,720	2.00	\$2.0	LIN FT	1,360	100.00%		LONG SHLD JT R&S	
	\$1,360		\$2.0	LIN FT		100.00%		CNTR LINE JOINT R&S	
	\$2,992		\$2.0	LINFT		50.00%		RNDM / THRM CRACK R&S	
	\$363		\$90.8	SQ YD	4	0.10%	DWEs =	PD PVMT PATCH M&F SURF	
\$6,	\$7,435	3626 X	0.862	PW=		0.8626	PWFn =		
	60.700	000	¢2.0	LINIET	1 260	100.00%		LONG SHLD JT R&S	YEAR 10
	\$2,720		\$2.00 \$2.00	LIN FT	THE RESERVE OF THE PARTY OF THE	100.00%		CNTR LINE JOINT R&S	
	\$1,360 \$2,992		\$2.0	LINFT		50.00%		RNDM / THRM CRACK R&S	
	\$1,635		\$90.8	SQ YD		0.50%		PD PVMT PATCH M&F SURF	
\$6,	\$8,707	7441 X		PW=		0.7441	PWFn =		
									YEAR 15
	\$9,068		\$2.50	SQ YD		100.00%		MILL PVMT & SHLD 2.00"	
	\$3,270		\$90.8	SQ YD		1.00%	2.00"	PD PVMT PATCH M&F ADD'L	
	\$39,386		\$10.8	SQ YD		100.00%		HMA OVERLAY PVMT 2.00"	CERTIFICATION AND ADDRESS.
\$33,	\$0 \$51,724	0.86 6419 X	\$10.8	SQ YD PW =	0	0.6419	PWFn =	HMA OVERLAY SHLD 2.00 "	
400,			0.041						VEAD OF
	\$2,720	2.00	\$2.0	LINFT	1.360	100.00%		LONG SHLD JT R&S	YEAR 20
	\$1,360		\$2.0	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$2,992		\$2.0	LINFT		50.00%		RNDM / THRM CRACK R&S	CONTRACTOR OF THE PARTY OF THE
	\$363	0.83	\$90.8	SQ YD		0.10%		PD PVMT PATCH M&F SURF	
\$4,	\$7,435	5537 X	0.553	PW=		0.5537	PWFn =		
									YEAR 25
	\$2,720		\$2.0	LINFT		100.00%		LONG SHLD JT R&S	
	\$1,360		\$2.0	LIN FT		100.00%		CNTR LINE JOINT R&S	
	\$2,992 \$1,635		\$2.00 \$90.83	SQYD		50.00%		RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF	COLOR DESCRIPTION OF THE PERSON OF THE PERSO
\$4,	\$8,707	1776 X		PW=	10	0.4776	PWFn =	PDFVIMI FATCH MIXE SORE	
								HMA_SD INTERSTATE	YEAR 30
	\$9,068	2.50	\$2.50	SQ YD	3,627	100.00%		MILL PVMT ONLY 2.00"	
	\$6,631	0.83	\$90.8	SQ YD	73	2.00%	2.00"	PD PVMT PATCH M&F ADD'L	
	\$0	9.71	\$89.7	SQ YD	0	1.00%	2.00"	PD SHLD PATCH M&F SURF	
	\$73,848		\$20.3	SQ YD		100.00%		HMA OVERLAY PVMT 3.75"	
\$36,	\$89,547	9.50 4120 X	9.50	SQ YD PW =	0	0.4120	PWFn =	HMA OVERLAY SHLD 1.75"	
\$30 ,	400,047	1120 A	0.412			0.4120	74111-		
	\$2,720	2.00	\$2.0	LINFT	1.360	100.00%		LONG SHLD JT R&S	YEAR 35
	\$1,360		\$2.0	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$2,992		\$2.0	LINFT		50.00%		RNDM / THRM CRACK R&S	
	\$363		\$90.8	SQ YD	4	0.10%	DIA/En -	PD PVMT PATCH M&F SURF	
\$2,	\$7,435	3554 X	0.355	PW=		0.3554	PWFn =		
	\$2,720	2.00	\$2.0	LIN FT	1 360	100.00%		LONG SHLD JT R&S	YEAR 40
	\$1,360		\$2.0	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$2,992		\$2.0	LINFT		50.00%		RNDM / THRM CRACK R&S	
	\$1,635		\$90.8	SQ YD		0.50%		PD PVMT PATCH M&F SURF	
\$2,	\$8,707	3066 X		PW=		0.3066	PWFn =		
\$96,									
	\$0	0.00	0.0	Lane Miles	0.52		IVITY	ROUTINE MAINTENANCE ACT	
\$96			ENANCE L						
\$30	DED MILE	JAL COST	TALILIAIA TO	INITENIANIC	BAA	7050	CRFn = 0.040	YEAR LIFE CYCLE	AF

PCC PAVEMENT 100ft South Of Case Ret to US 48						Salata Salata	
SECTION 100ft South Of Dasger Rd to US 45	PCC PAVEMENT						JPCP
SECTION 100ft South Of Dasger Rd to US 45	POLITE		11 02				
COUNTY Lake COUNTY LACE COUNTY COUN							
PROJECT LENGTH							
PROJECT LENGTH	LOCATION 100ft Sou	ith Of Osage	Rd to US 45				
# OF CANNES	FACILITY TYPE	1	NTERSTATE				
# OF CANNES	PROJECT LENGTH		680	FT ==>	0.13	Miles	
# OF EDGES 2 EP 12 FT 14							
NOTIFICATION PCC Outside OFT							
PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS (RIGID AUXILIARY SHOULDER THICKNESS (RIGID) SHOULDE							
PAVEMENT THICKNESS (RIGID) SPCP 10.00 IN TIED SHLD							
POLICY OVERLAY THICKNESS 3.75 IN							
POLICY OVERLAY THICKNESS 3.75 IN							
POLICY OVERLAY THICKNESS 3.75 IN	DAVEMENT THOUSED (DIOID)	Inon	40.00		TIED OUI D		
POLICY OVERLAY THICKNESS 3.75 IN		JPCP			TIED SHLD		
RIGID PAVEMENT TRAFFIC FACTORS							
Note: * Denotes User Supplied Item Reserved For User Supplied Item Reserved For User Supplied Item Pavement (** Denotes User Supplied Quantity** Note: * Denotes User Supplied Quantity** Maintenance Costs: Titlem Thickness 10.05 Materials Mate	POLICY OVERLAY THICKNESS		3.75	IN			
Notesheet Construction Type is New Construction The Pavement Type is COST	RIGID PAVEMENT TRAFFIC FACTORS					A STATE OF THE PARTY OF THE PAR	
NITIAL COSTS THICKNESS	Worksheet Construction Type is New Construction		10.05	The Pa			
THEM							
PAVEMENT REINFORCEMENT		100	% QUANTITY	UNIT	UNIT PRICE		COST
PAVEMENT REINFORCEMENT	JPC PAVEMENT (10.00")		3 627	SO YD	\$40.52	/SO YD	\$146 966
PCC SHOULDERS							
CURB & GUTTER 0 LIN FT \$30.00 / LIN FT \$0 SUBBASE GRAN MATL TY C IMPROVED SUBGRADE: 11 TONS \$225.00 / TON \$275 (MPROVED SUBGRADE) \$333 SQ YD \$10.00 / SQ YD \$53,330 Reserved For User Supplied Item 0 UNITS \$0.00 / UNITS \$0 \$53,330 Reserved For User Supplied Item 0 UNITS \$0.00 / UNITS \$0 \$0 PAVEMENT REMOVAL 3,627 SQ YD \$0.00 / SQ YD \$0 <td< td=""><td>STABILIZED SUBBASE (4.50")</td><td></td><td>3,853</td><td>SQ YD</td><td>\$15.00</td><td>/ SQ YD</td><td>\$57,795</td></td<>	STABILIZED SUBBASE (4.50")		3,853	SQ YD	\$15.00	/ SQ YD	\$57,795
CURB & GUTTER \$ LIN FT \$ \$30.00 / LIN FT \$ \$0 SUBBASE GRAN MATL TY C IMPROVED SUBGRADE: 11 TONS * \$22.50 / TON \$27.50 \$25.00 / TON \$27.50 \$53,330 \$25.00 / SQ YD \$50.00 / SQ YD	PCC SHOULDERS (10.00" to 10.00")		0 :	SQ YD	\$35.52	/ SQ YD	\$0
MPROVED SUBGRADE: Aggregate 5,333 SQ YD \$10.00 /SQ YD \$53,330	CURB & GUTTER		0 1	LIN FT	\$30.00	/LIN FT	\$0
MPROVED SUBGRADE: Aggregate 5,333 SQ YD \$10.00 SQ YD \$53,330	SUBBASE GRAN MATL TY C (~ 0.00")		11	TONS *	\$25.00	/TON	\$275
Reserved For User Supplied Item	IMPROVED SUBGRADE: Aggregate		5,333	SQ YD *	\$10.00	/ SQ YD	\$53,330
PAVEMENT REMOVAL 3,627 SQ YD \$0.00 /SQ YD \$0.00 SQ Y	Reserved For User Supplied Item		0	UNITS	\$0.00	/UNITS	\$0
SQ YD \$0.00 /SQ Y	Reserved For User Supplied Item		0	UNITS	\$0.00	/UNITS	\$0
SQ YD \$0.00 /SQ YD \$0.00	PAVEMENT REMOVAL		3,627	SQ YD	\$0.00	/ SQ YD	\$0
MAINTENANCE COSTS:							
MAINTENANCE COSTS:	Note: * Denotes User Supplied Quantity		RIGID CONS	TRUCTION	N INITIAL COST		\$258,366
THICKNESS MATERIAL UNIT COST		RIGID CON	ISTRUCTION	ANNUAL C	OST PER MILE		
THICKNESS MATERIAL UNIT COST							
ROUTINE MAINTENANCE ACTIVITY ### POLICY OVERLAY HMA POLICY OVERLAY PVMT HMA POLICY OVERLAY PVMT HMA SURFACE MIX HMA SURFACE MIX HMA BINDER MIX (2.25") HMA POLICY OVERLAY SHLD CLASS A PAVEMENT PATCHING CLASS A PAVEMENT PATCHING CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50") LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT			MATERIAL		LINIT COOT		
HMA POLICY OVERLAY	THICKNESS		MATERIAL		UNIT COST		
HMA POLICY OVERLAY PVMT	ROUTINE MAINTENANCE ACTIVITY				\$0.00	/ LANE-MILI	E/YEAR
HMA SURFACE MIX	HMA POLICY OVERLAY (3.75")			3.73			
HMA BINDER MIX						Color State Color Control Color	
HMA POLICY OVERLAY SHLD (3.75") Shoulder Mix \$20.36 /SQYD CLASS A PAVEMENT PATCHING \$170.00 /SQYD CLASS B PAVEMENT PATCHING \$130.00 /SQYD CLASS C SHOULDER PATCHING \$130.00 /SQYD PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) Surface Mix \$88.17 /SQYD PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50") Surface Mix \$88.17 /SQYD LONGITUDINAL SHOULDER JOINT ROUT & SEAL \$2.00 /LIN FT CENTERLINE JOINT ROUT & SEAL \$2.00 /LIN FT REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 /LIN FT							
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50") LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT		1,202					
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50") LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT	CLASS A BAVEMENT DATCHING				\$170.00	/SO VD	
CLASS C SHOULDER PATCHING \$110.00 / SQ YD PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) Surface Mix Surface Mix S88.17 / SQ YD LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL \$2.00 / LIN FT REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT							
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50") LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT							
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50") LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT	PARTIAL DEPTH DIAMT PATCH (Mill & Eill LIMA S	Ð	Surface Min		¢00 47	ISOVD	
LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT							
CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT							
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT							
		Rehab = 100.00	/ Station / Lane)				

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

PRES	COST		UNIT COST	UNIT	QUANTITY	%	ITEM	MAINTENANCE COSTS:
								YEAR 10
	\$520		\$130.00	SQ YD	4	0.10%	PAVEMENT PATCH CLASS B	
\$	\$520	X	0.7441	PW=		0.7441	PWFn =	
								YEAR 15
	\$910		\$130.00	SQ YD	7	0.20%	PAVEMENT PATCH CLASS B	
\$	\$910	X	0.6419	PW=		0.6419	PWFn =	
								YEAR 20
	\$9,490		\$130.00	SQ YD	73	2.00%	PAVEMENT PATCH CLASS B	
	\$0		\$110.00	SQ YD	0	0.50%	SHOULDER PATCH CLASS C	
	\$2,720		\$2.00	LINFT	1.360	100.00%	LONGITUDINAL SHLD JT R&S	
	\$1,360		\$2.00	LINFT		100.00%	CENTERLINE JT R&S	
\$7	\$13,570	X	0.5537	PW=		0.5537	PWFn =	
		2000						YEAR 25
	\$14,170	A COLUMN	\$130.00	SQ YD	109	3.00%	PAVEMENT PATCH CLASS B	
	\$0		\$110.00	SQ YD	0	1.00%	SHOULDER PATCH CLASS C	
\$6	\$14,170	X	0.4776	PW=		0.4776	PWFn =	
							INTERSTATE	YEAR 30
	\$18,850		\$130.00	SQ YD	145	4.00%	PAVEMENT PATCH CLASS B	
	\$0		\$110.00	SQ YD	0	1.50%	SHOULDER PATCH CLASS C	
	\$73,848		\$20.36	SQ YD	3,627	100.00%	HMA POLICY OVERLAY 3.75" (PVMT)	
	\$0		\$20.36	SQ YD	0	100.00%	HMA POLICY OVERLAY 3.75" (SHLD)	
\$38	\$92,698	X	0.4120	PW=		0.4120	PWFn =	
							INTERSTATE	YEAR 35
	\$2,720		\$2.00	LIN FT	1,360	100.00%	LONGITUDINAL SHLD JT R&S	
	\$1,360		\$2.00	LIN FT	680	100.00%	CENTERLINE JT R&S	
	\$2,720		\$2.00	LIN FT	1,360	50.00%	RANDOM CRACK R&S	
	\$1,728		\$2.00	LIN FT		40.00%	REFLECTIVE TRANSVERSE CRACK R&S	
	\$353		\$88.17	SQ YD		0.10%	PD PVMT PATCH M&F HMA SURF 1.50"	
\$3	\$8,881	Х	0.3554	PW=		0.3554	PWFn =	
							INTERSTATE	YEAR 40
	\$2,340		\$130.00	SQ YD	18	0.50%	PAVEMENT PATCH CLASS B	
	\$2,720		\$2.00	LIN FT	1,360	100.00%	LONGITUDINAL SHLD JT R&S	
	\$1,360		\$2.00	LIN FT		100.00%	CENTERLINE JT R&S	
	\$2,592		\$2.00	LINFT		60.00%	REFLECTIVE TRANSVERSE CRACK R&S	
	\$2,720		\$2.00	LINFT		50.00%	RANDOM CRACK R&S	
	\$1,587		\$88.17	SQ YD		0.50%	PD PVMT PATCH M&F HMA SURF 1.50"	
\$4	\$13,319	X	0.3066	PW=		0.3066	PWFn =	
\$60								
	\$0		\$0.00	Lane Miles	0.52		ROUTINE MAINTENANCE ACTIVITY	
\$60	CLE COST	-CYC	ENANCE LIFE	MAINT				
\$19			E ANNUAL C		MA	7852	YEAR LIFE CYCLE CRFn = 0.040	45

			JPCP	НМА	
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$258,366	\$253,509	
	1111112 0001	ANNUAL COST PER MILE	\$81,821	\$80,282	
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$60,681	\$96,571	
		ANNUAL COST PER MILE	\$19,217	\$30,583	
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$319,047	\$350,080	
		ANNUAL COST PER MILE	\$101,037	\$110,865	
LIFE-CYCL	E COST ANALYSIS:	FINAL SUMMARY			
LIFE-CYCL		FINAL SUMMARY	JPCP	\$101,037	

Printed: 11/07/2013

2 5401 Template (Rev. 10/05/2012)		AND TOACE					Printed: 1	1/0//2013
	and the same of th	AND TRAFFI	CINPU	15	(Enter Data	in Gray Shad	ded Cells)	
Route: US 45	Comments							
Section: 49-Y								
County: Lake	Design Date:	05/09/2013	CI	< BY			_	
Location: at Butterfield Road	Modify Date:			< BY	ADT	Year		
	-			Current:	19,200	2002		
Facility Type Other Marked State Route				Future:	27,000	2030		
# of Lanes =	= 4							
				No.	Structural D	Design Traffic		
				Minimum	Actual	Actual %of	% of AD	T in
Road Class	a 1	122		ADT	ADT	Total ADT	Design L	ane
			PV =	0	24,013	95.9%	P=	32%
Subgrade Support Rating (SSR):	Poor		SU =	250	554	2.2%	S=	45%
Construction Year:	2013		MU =	750	483	1.9%	M =	45%
Design Period (DP) =	20	years	Struct.	Design ADT =	25,050	(2023)		
								
		TRAFFIC FA	CTOR CA	ALCULATION	<u>l</u>			
FLEXIBLE	PAVEMENT				RIGID	PAVEMENT	•	
Cpv =	= 0.15				Cpv =	0.15		
Csu =	132.5				Csu =			
Cmu =					Cmu =			
TF flexible (Actual) =		(Actual ADT)		TF rio	id (Actual) =		(Actual ADT)	
TF flexible (Min) =		(Min ADT Fig. 54-2	C)		rigid (Min) =		(Min ADT Fig. 5	420
TT TIEXIDIE (WIIT) -	- 5.56	(William Fig. 54-2	.0)	IF	rigia (Mili) –	5.02	(William ADT Fig. 5	4-2.0)

	NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS									
	Full-Depth HMA Pavement				JPC Pavement					
	Use TF flexible = PG Grade Lower Binder Lifts =	3.56 PG 64-22	(Fig. 53-4.R)	Use TF rigid = Edge Support =	5.02 Tied	Shoulder or C.&G.				
Goto Map	HMA Mixture Temp. =	74.5	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	9.00	in. (Fig. 54-4.E)				
SHEED OF THE LOND	Design HMA Mixture Modulus (E_{HMA}) =	710	ksi (Fig. 54-5.D)							
	Design HMA Strain (ϵ_{HMA}) =	84	(Fig. 54-5.E)	(CRC Pav	ement				
Goto Map	Full Depth HMA Design Thickness =	10.00	in. (Fig. 54-5.F)	Use TF rigid =	5.02					
Goto Iviap	Limiting Strain Criterion Thickness =	14.75	in. (Fig. 54-5.I)	IBR value =	2					
	Use Full-Depth HMA Thickness =	10.00	inches	CRCP Thickness =	8.25	in. (Fig. 54-4.M)				

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY	RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS								
HMA Overlay of Rubblized PCC Unbonded Concrete Overlay									
Use TF flexible = 3	3.56	Review 54-4.03 for limitations and							
District = 3,4	4,5,6	special considerations.							
HMA Overlay Design Thickness = 8	3.00 in. (Fig. 54-5.U)	JPCP Thickness = NA inches							

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more	2 lanes with ADT > 2000	2 Lanes	2 Lanes
Part of a future 4 lanes or more	One way Street with ADT <= 3500	(ADT 750 -2000)	(ADT < 750)
One-way Streets with ADT > 3500			100

	Min. Str.	Design Traffic (Fig	54-2.C)
Facility Type	PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

	T	raffic Factor ESA	AL Coefficients		
	Rigid (F	ig. 54-4.C)	Flexible (Fig. 54-5.E		
Class	Csu	Cmu	Csu	Cmu	
	143.81	696.42	132.50	482.53	
II	135.78	567.21	112.06	385.44	
III	129.58	562.47	109.14	384.35	
IV	129.58	562.47	109.14	384.35	
	NO. OF REAL PROPERTY.		CONTRACTOR STATE	The second	

Class Table for				
One-Way Streets				
ADT	Class			
0 - 3500	ll l			
>3501	1			

Class	Table for
2 or 3	3 lanes
(not futur	e 4 lane &
not one-v	way street)
ADT	Class
0 - 749	IV
750 - 2000	Ш
>2000	II.

	Design La	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.							
		Urban							
Number of Lanes	Р	S	M	Р	S	М			
1 Lane Ramp	100%	100%	100%	100%	100%	100%			
2 or 3	50%	50%	50%	50%	50%	50%			
4	32%	45%	45%	32%	45%	45%			
6 or more	20%	40%	40%	8%	37%	37%			

BDE 5401 Template (Rev. 10/05/2012) 11/07/2013 LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION **FULL-DEPTH HMA PAVEMENT** Standard Design ROUTE Job Route SECTION Job Section COUNTY **Job County** LOCATION Job Location FACILITY TYPE NON-INTERSTATE PROJECT LENGTH 1000 FT ==> 0.19 Miles # OF CENTERLINES 2 CL # OF LANES 4 LANES # OF FDGES 4 EP LANE WIDTH - AVERAGE 12 FT SHOULDER WIDTH HMA Inside 6 FT 10 FT PAVEMENT THICKNESS (FLEXIBLE) 12.00 IN 17.00 IN MAX SHOULDER THICKNESS 12.00 IN Standard Design POLICY OVERLAY THICKNESS FLEX PAVEMENT TRAFFIC FACTORS USE MINIMUM ACTUAL 1.00 7.11 Read Mel COST PER TON UNIT PRICE HMA SURFACE \$95.00 /TON HMA TOP BINDER \$90.00 /TON HMA LOWER BINDER \$85.00 /TON HMA BINDER (LEVELING) \$95.00 /TON HMA SHOULDER \$85.00 / TON INITIAL COSTS THICKNESS 100% QUANTITY UNIT **UNIT PRICE** COST HMA PAVEMENT (FULL-DEPTH) (12.00") 5,333 SQ YD \$61.27 / SQ YD \$326,781 ~ HMA SURFACE COURSE 5.333 SQ YD (2.00" \$10.71 / SQ YD \$0 HMA TOP BINDER COURSE (2.25" 5,333 SQ YD \$11.59 / SQ YD \$0 HMA LOWER BINDER COURSE (7.75" 5,333 SQ YD \$38.97 / SQ YD (12.00") \$148,373 HMA SHOULDER 3,556 SQ YD \$41.73 /SQ YD **CURB & GUTTER** 0 LIN FT \$30.00 /LIN FT \$0 SUBBASE GRAN MATL TY C (TONS) 0 TONS \$25.00 / TON IMPROVED SUBGRADE: 5,333 SQ YD Aggregate \$10.00 / SQ YD \$53 330 Reserved For User Supplied Item 0 UNITS \$0.00 / UNITS \$0 Reserved For User Supplied Item 0 UNITS \$0.00 /UNITS \$0 PAVEMENT REMOVAL \$0.00 / SQ YD 5,333 SQ YD \$0 SHOULDER REMOVAL 3.556 SQ YD \$0.00 / SQ YD \$0 FLEXIBLE CONSTRUCTION INITIAL COST Note: * Denotes User Supplied Quantity \$528,484 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$113,807 MAINTENANCE COSTS: THICKNESS MATERIAL UNIT COST ITEM ROUTINE MAINTENANCE ACTIVITY \$0.00 LANE-MILE / YEAR HMA OVERLAY PVMT SURF (2.00") Surface Mix \$10.00 / SQ YD HMA OVERLAY PVMT (2.25" \$11.25 / SQ YD HMA SURFACE MIX (1.50" Surface Mix \$7.50 / SQ YD \$3.75 /SQ YD HMA BINDER MIX (0.75" eling Binder Mix HMA OVERLAY SHLD \$11.25 / SQ YD (Year 30) (2.25" Shoulder Mix HMA OVERLAY SHLD (2.00") \$10.00 /SQYD Shoulder Mix MILLING (2.00 IN) \$2.50 /SQ YD PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf) Surface Mix \$90.83 / SQ YD PARTIAL DEPTH SHLD PATCH \$89.71 /SQ YD (Mill & Fill Surf) Shoulder Mix PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00 ") Leveling Binder Mix \$90.83 / SQ YD PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00 ") Shoulder Mix \$89.71 / SQ YD LONGITUDINAL SHOULDER JOINT ROUT & SEAL \$2.00 / LIN FT CENTERLINE JOINT ROUT & SEAL \$2.00 / LIN FT

(100% Rehab = 110.00' / Station / Lane)

RANDOM / THERMAL CRACK ROUT & SEAL

\$2.00 / LIN FT

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

PRESEN WORT	COST	ST	UNIT COST	UNIT	QUANTITY	%		ITEM	MAINTENANCE COSTS:
	\$8,000	10	\$2.00	LINFT	4.000	100.00%		LONG SHLD JT R&S	YEAR 5
	\$4,000		\$2.00	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$4,400		\$2.00	LINFT		50.00%		RNDM / THRM CRACK R&S	
	\$454		\$90.83	SQ YD		0.10%		PD PVMT PATCH M&F SURF	
\$14,538	\$16,854		0.8626	PW=		0.8626	PWFn =		
									YEAR 10
	\$8,000	00	\$2.00	LIN FT	4,000	100.00%		LONG SHLD JT R&S	
	\$4,000	00	\$2.00	LIN FT	2,000	100.00%		CNTR LINE JOINT R&S	
	\$4,400	00	\$2.00	LINFT	2,200	50.00%		RNDM / THRM CRACK R&S	
	\$2,452	33	\$90.83	SQ YD	27	0.50%		PD PVMT PATCH M&F SURF	
\$14,028	\$18,852	41 X	0.7441	PW=		0.7441	PWFn =		
									YEAR 15
	\$22,223	50	\$2.50	SQ YD	8,889	100.00%		MILL PVMT & SHLD 2.00"	
	\$4,814		\$90.83	SQ YD		1.00%	2.00"	PD PVMT PATCH M&F ADD'L	
	\$53,333		\$10.00	SQ YD		100.00%		HMA OVERLAY PVMT 2.00"	
	\$35,556		\$10.00	SQ YD	3,556	100.00%		HMA OVERLAY SHLD 2.00 "	
\$74,40	\$115,926	19 X	0.6419	PW=		0.6419	PWFn =		
							Shara		YEAR 20
	\$8,000		\$2.00	LINFT		100.00%		LONG SHLD JT R&S	
	\$4,000		\$2.00	LIN FT		100.00%		CNTR LINE JOINT R&S	
	\$4,400		\$2.00	LIN FT		50.00%		RNDM / THRM CRACK R&S	
00.00	\$454		\$90.83	SQ YD	5	0.10%	DIAM	PD PVMT PATCH M&F SURF	
\$9,33	\$16,854	37 X	0.5537	PW=		0.5537	PWFn =		
	40.000					100.000			YEAR 25
	\$8,000		\$2.00	LINFT		100.00%		LONG SHLD JT R&S	
	\$4,000		\$2.00	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$4,400		\$2.00	LINFT		50.00%		RNDM / THRM CRACK R&S	
\$9,00	\$2,452 \$18,852		\$90.83 0.4776	SQ YD PW =	21	0.50%	PWFn =	PD PVMT PATCH M&F SURF	
								HMA_SD	
	600,000	-0	00.50	COVO	0.000	100 000/			YEAR 30
	\$22,223		\$2.50	SQ YD		100.00%	2 00!!	MILL PVMT & SHLD 2.00"	
	\$9,719		\$90.83	SQ YD		2.00%		PD PVMT PATCH M&F ADD'L	
	\$3,230		\$89.71	SQ YD		1.00%	2.00"	PD SHLD PATCH M&F ADD'L	
	\$60,000 \$40,000		\$11.25 \$11.25	SQ YD SQ YD		100.00%		HMA OVERLAY PVMT 2.25" HMA OVERLAY SHLD 2.25"	
\$55,68	\$135,172		\$11.25 0.4120	PW =	3,336	0.4120	PWFn =	THINA OVERLAT SHLU 2.25	
									VEAD OF
	\$8,000	00	\$2.00	LINFT	4,000	100.00%		LONG SHLD JT R&S	YEAR 35
	\$4,000	00	\$2.00	LIN FT	2,000	100.00%		CNTR LINE JOINT R&S	
	\$4,400		\$2.00	LIN FT		50.00%		RNDM / THRM CRACK R&S	
05.00	\$454		\$90.83	SQ YD	5	0.10%	DIACE	PD PVMT PATCH M&F SURF	
\$5,99	\$16,854	54 X	0.3554	PW=		0.3554	PWFn =		
									YEAR 40
	\$8,000		\$2.00	LINFT		100.00%		LONG SHLD JT R&S	
	\$4,000		\$2.00	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$4,400		\$2.00	LINFT		50.00%		RNDM / THRM CRACK R&S	
\$5,77	\$2,452 \$18,852		\$90.83 0.3066	SQ YD PW =	27	0.50%	PWFn =	PD PVMT PATCH M&F SURF	
\$188,76									
\$	\$0	20	s 0.00	Lane Miles	0.76		TIVITY	ROUTINE MAINTENANCE ACT	
	20		. 0.00	came lymes	0.70		IVIII	ROUTINE WAINTENANCE ACT	

PCC PAVEMENT			JPCP
POUTE			
ROUTE SECTION	Job Route Job Section		
COUNTY	Job County		
LOCATION	Job Location		
FACILITY TYPE	NON-INTERSTATE		
PROJECT LENGTH	4000 FT	0.40 147	
# OF CENTERLINES	1000 FT ==> 2 CL	0.19 Miles	
# OF LANES	4 LANES		
# OF EDGES	4 EP		
LANE WIDTH - AVERAGE SHOULDER WIDTH PCC Inside	12 FT		
SHOULDER WIDTH PCC Inside PCC Outside	6 FT 10 FT		
PAVEMENT THICKNESS (RIGID)	JPCP 10.00 IN	TIED SHLD	
SHOULDER THICKNESS	10.00 IN		
POLICY OVERLAY THICKNESS	2.50 IN		
RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
Worksheet Construction Type is New Construction	10.05 The Pa	1.00 avement Type is	10.05 JPCP
		avenient Type is	31-01
INITIAL COSTS ITEM THICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
JPC PAVEMENT (10.00")	5 222 CO VD	\$50.00 LOOVE	6000.050
JPC PAVEMENT (10.00") PAVEMENT REINFORCEMENT	5,333 SQ YD 0 SQ YD	\$50.00 /SQYD \$0.00 /SQYD	\$266,650 \$0
STABILIZED SUBBASE (4.50")	6,000 SQ YD	\$15.00 /SQ YD	\$90,000
PCC SHOULDERS (10.00" to 10.00")	3,556 SQ YD	\$45.00 /SQYD	\$160,020
CURB & GUTTER	0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (~4.23")	0 TONS *	\$25.00 (TO)	***
IMPROVED SUBGRADE: Aggregate	5,333 SQ YD	\$25.00 / TON \$10.00 / SQ YD	\$0 \$53,330
		7,000,700,75	400,000
Reserved For User Supplied Item	0 UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item	0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL	5,333 SQ YD	\$0.00 /SQYD	\$0
SHOULDER REMOVAL	3,556 SQ YD	\$0.00 / SQ YD	\$0
Note: * Poneto: Head Constitut Constitut			
Note: * Denotes User Supplied Quantity	RIGID CONSTRUCTION RIGID CONSTRUCTION ANNUAL (\$570,000
	RIGID CONSTRUCTION ANNUAL (SOST PER MILE	\$122,747
MAINTENANCE COSTS:			
ITEM THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY		\$0.00 / LANE-MILI	E/YEAR
HMA POLICY OVERLAY (2.50")			
HMA POLICY OVERLAY PVMT (2.50")	4.9667	\$12.50 /SQYD	
HMA SURFACE MIX (1.50")	Surface Mix 1.35	\$7.50 / SQ YD	
HMA BINDER MIX (1.00") HMA POLICY OVERLAY SHLD (2.50")	aling Binder Mix	\$5.00 /SQ YD	
HMA POLICY OVERLAY SHLD (2.50")	Shoulder Mix	\$12.50 / SQ YD	
CLASS A PAVEMENT PATCHING		\$170.00 /SQYD	
CLASS B PAVEMENT PATCHING		\$130.00 /SQ YD	
CLASS C SHOULDER PATCHING		\$110.00 / SQ YD	
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)	Surface Mix 1.59	\$88.17 /SQYD	
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50		\$93.49 / SQ YD	
LONGITUDINAL SHOULDER JOINT ROUT & SEAL		\$2.00 (11)	
CENTERLINE JOINT ROUT & SEAL		\$2.00 / LIN FT \$2.00 / LIN FT	
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL		\$2.00 / LIN FT	
RANDOM CRACK ROUT & SEAL (100% Re	hab = 100.00' / Station / Lane)	\$2.00 / LIN FT	

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

PRESENT WORTH	COST		UNIT COST	UNIT	QUANTITY	%		ITEM	MAINTENANCE COSTS:
		M							YEAR 10
	\$650		\$130.00	SQ YD	5	0.10%		PAVEMENT PATCH CLASS B	LILAN 10
\$484	\$650	X	0.7441	PW=		0.7441	PWFn =	TAVENCENT ATOM CEACOD	
									YEAR 15
	\$1,430		\$130.00	SQ YD	11	0.20%		PAVEMENT PATCH CLASS B	TEAR 15
\$918	\$1,430	Х	0.6419	PW=		0.6419	PWFn =		
									YEAR 20
	\$13,910		\$130.00	SQ YD	107	2.00%		PAVEMENT PATCH CLASS B	
	\$1,980		\$110.00	SQ YD		0.50%		SHOULDER PATCH CLASS C	
	\$8,000		\$2.00	LINFT		100.00%		LONGITUDINAL SHLD JT R&S	
	\$4,000		\$2.00	LINFT		100.00%		CENTERLINE JT R&S	
\$15,442	\$27,890	X	0.5537	PW=		0.5537	PWFn =		
									YEAR 25
	\$20,800		\$130.00	SQ YD	160	3.00%		PAVEMENT PATCH CLASS B	
	\$3,960		\$110.00	SQ YD	36	1.00%		SHOULDER PATCH CLASS C	
\$11,826	\$24,760	X	0.4776	PW=		0.4776	PWFn =		
								NON-INTERSTATE	YEAR 30
	\$27,690		\$130.00	SQ YD	213	4.00%		PAVEMENT PATCH CLASS B	
	\$5,830		\$110.00	SQ YD	53	1.50%		SHOULDER PATCH CLASS C	
	\$66,667		\$12.50	SQ YD	5,333	100.00%		HMA POLICY OVERLAY 2.5" (
	\$44,445		\$12.50	SQ YD	3,556	100.00%		HMA POLICY OVERLAY 2.5" (
\$59,586	\$144,632	X	0.4120	PW=		0.4120	PWFn =		
								NON-INTERSTATE	YEAR 35
	\$8,000		\$2.00	LINFT	THE RESERVE OF CHILDREN STATES	100.00%		LONGITUDINAL SHLD JT R&S	
	\$4,000		\$2.00	LINFT		100.00%		CENTERLINE JT R&S	
	\$4,000		\$2.00	LINFT		50.00%		RANDOM CRACK R&S	
	\$2,572		\$2.00	LINFT		40.00%		REFLECTIVE TRANSVERSE CR	
\$6,766	\$467 \$19,039	V	\$93.49 0.3554	SQ YD PW =	5	0.10%	.50" PWFn =	PD PVMT PATCH M&F HMA 2	
\$0,700	\$19,039	^	0.5554			0.0004	r vvi ii –		
		BI							YEAR 40
	\$3,510		\$130.00	SQ YD	27	0.50%		PAVEMENT PATCH CLASS B	
	\$8,000		\$2.00	LIN FT	4,000	100.00%		LONGITUDINAL SHLD JT R&S	
	\$4,000		\$2.00	LINFT	2,000	100.00%		CENTERLINE JT R&S	
	\$3,860		\$2.00	LIN FT	1,930	60.00%	RACK R&S	REFLECTIVE TRANSVERSE CR	
	\$4,000		\$2.00	LIN FT	2,000	50.00%		RANDOM CRACK R&S	
	\$2,524		\$93.49	SQ YD	27	0.50%	.50"	PD PVMT PATCH M&F HMA 2	
\$7,938 \$102,960	\$25,894	X	0.3066	PW=		0.3066	PWFn =		
ψ102,300									
\$0	\$0	CV	\$0.00	Lane Miles	0.76		VITY	ROUTINE MAINTENANCE ACTIV	
\$102,960 \$22,172			ENANCE LIFE E ANNUAL CO		MA	7852	CRFn = 0.0407	YEAR LIFE CYCLE	45

			JPCP	LINAA	
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$570,000	HMA \$528,484	
one meetien	WITH LE GOOT	ANNUAL COST PER MILE	\$122,747	\$113,807	
				4110,001	
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$102,960	\$188,768	
		ANNUAL COST PER MILE	\$22,172	\$40,650	
OTAL	LIFE-CYCLE COST	PRESENT WORTH	\$672,960	\$717,252	
IOTAL	Ell E-010EE 0001	ANNUAL COST PER MILE	\$144,919	\$154,457	
_IFE-CYCL	E COST ANALYSIS	S: FINAL SUMMARY			
		S: FINAL SUMMARY	JPCP	\$144,919	
OWEST COST OPT		S: FINAL SUMMARY TYPE / PERCENTAGE	JPCP HMA	\$144,919 \$154,457	6.6%

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 11/07/2013 PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells) Route: IL Route 21 Section: 49-Y County: Lake Design Date: 05/14/2013 <-- BY Location: River Grove Lane to US45 Modify Date: 05/14/2013 ADT <-- BY Year 37,100 Current: 2002 Facility Type Other Marked State Route Future: 43,200 2030 # of Lanes = 4 Structural Design Traffic Minimum Actual Actual %of % of ADT in Road Class: ADT ADT Total ADT Design Lane PV = 40,029 0 96.1% P= 32% Subgrade Support Rating (SSR): Poor SU = 250 788 1.9% S= 45% Construction Year: 2013 MU = 750 859 2.1% M = 45% Design Period (DP) = 20 Struct. Design ADT = 41,675 (2023)TRAFFIC FACTOR CALCULATION FLEXIBLE PAVEMENT RIGID PAVEMENT Cpv = 0.15 Cpv = 0.15 Csu = 132.5 Csu = 143.81 482.53 696.42 Cmu = Cmu = TF flexible (Actual) = 4.71 (Actual ADT) TF rigid (Actual) = 6.44 (Actual ADT)

	Full-Depth HMA Pavement			JPC Pavement		
	Use TF flexible =	4.71		Use TF rigid =	6.44	
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.
Goto Map	HMA Mixture Temp. =	73.0	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	9.25	in. (Fig. 54-4.E)
[Design HMA Mixture Modulus (E _{HMA}) =	760	ksi (Fig. 54-5.D)			
	Design HMA Strain (ϵ_{HMA}) =	77	(Fig. 54-5.E)	(CRC Pave	ement
	Full Depth HMA Design Thickness =	10.25	in. (Fig. 54-5.F)	Use TF rigid =	6.44	
Goto Map	Limiting Strain Criterion Thickness =	14.25	in. (Fig. 54-5.I)	IBR value =	2	
	Use Full-Depth HMA Thickness =	10.25	inches	CRCP Thickness =	8.50	in. (Fig. 54-4.M)
				TF MUST E	3E > 60	FOR CRCP

(Min ADT Fig. 54-2.C)

TF flexible (Min) =

3.56

PECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

(Min ADT Fig. 54-2.C)

RECONSTRUCTION ONLY (SOFFLEMENTAL) PAVI	EINIENT DESIGN CALCULATIONS
HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 4.71	Review 54-4.03 for limitations and
District = 3,4,5,6	special considerations.
HMA Overlay Design Thickness = 8.75 in. (Fig. 54-5.U)	JPCP Thickness = NA inches
	CONTRACT DURING FOR ACCIOTANCE

CONTACT BMPR FOR ASSISTANCE

5.02

TF rigid (Min) =

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN Class II Roads Class III Roads Class IV Roads Class I Roads 4 lanes or more 2 lanes with ADT > 2000 2 Lanes 2 Lanes Part of a future 4 lanes or more One way Street with ADT <= 3500 (ADT 750 -2000) (ADT < 750)One-way Streets with ADT > 3500 Min. Str. Design Traffic (Fig 54-2.C) Class Table for Facility Type PV SU MU One-Way Streets Interstate or Supplemental Freeway 500 1500 ADT Class Other Marked State Route 250 0 - 3500 750 II Unmarked State Route No Min No Min No Min >3501

	Traffic Factor ESAL Coefficients					
	Rigid (F	Flexible (F	ig. 54-5.B)			
Class	Csu	Cmu	Csu	Cmu		
CHEROLOGICAL CONTROL OF THE PARTY OF THE PAR	143.81	696.42	132.50	482.53		
II	135.78	567.21	112.06	385.44		
III	129.58	562.47	109.14	384.35		
IV	129.58	562.47	109.14	384.35		
			STATE OF THE PERSONS NO.			

Class	Table for
2 or 3	3 lanes
(not futur	e 4 lane &
not one-v	way street)
ADT	Class
0 - 749	
0-149	IV
750 - 2000	IV III

	Design La	ane Distribution F	actors For Str	uctural Desigi	n Traffic (Fig.	54-2.B)
		Rural			Urban	
Number of Lanes	Р	S	M	Р	S	М
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (Rev. 10/05/2012) Printed: 11/07/2013 LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION **FULL-DEPTH HMA PAVEMENT** Standard Design ROUTE IL Route 21 SECTION 49-Y COUNTY Lake LOCATION River Grove Lane to US45 FACILITY TYPE INTERSTATE PROJECT LENGTH 2640 FT ==> 0.50 Miles # OF CENTERLINES 1 CL # OF LANES 4 LANES # OF EDGES 2 EP LANE WIDTH - AVERAGE 12 FT SHOULDER WIDTH HMA Inside 0 FT HMA Outside 0 FT PAVEMENT THICKNESS (FLEXIBLE) 11.00 IN 14.25 IN MAX SHOULDER THICKNESS
POLICY OVERLAY THICKNESS 8.00 IN Standard Design 3 75 IN FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE 2.68 Read Mel HMA COST PER TON UNIT PRICE HMA SURFACE \$95.00 /TON HMA TOP BINDER \$90.00 / TON HMA LOWER BINDER \$85.00 / TON HMA BINDER (LEVELING) \$95.00 /TON HMA SHOULDER \$85.00 INITIAL COSTS THICKNESS 100% QUANTITY UNIT UNIT PRICE COST HMA PAVEMENT (FULL-DEPTH) (11.00") 14,080 SQ YD \$55.12 /SQ YD \$776.099 HMA SURFACE COURSE 14,080 SQ YD \$10.22 / SQ YD \$0 (2.00") HMA TOP BINDER COURSE (2.25") 14,080 SQ YD \$9.73 /SQ YD \$0 HMA LOWER BINDER COURSE (6.75" 14.080 SQ YD \$24.36 /SQ YD \$0 HMA SHOULDER (8.00") O SO YD \$41.73 /SQ YD \$0 **CURB & GUTTER** O LIN FT \$30.00 /LIN FT \$0 SUBBASE GRAN MATL TY C (TONS) 44 TONS \$25.00 /TON \$1,100 IMPROVED SUBGRADE: Aggregate 5,333 SQ YD \$10.00 /SQ YD \$53,330 Reserved For User Supplied Item 0 UNITS \$0.00 / UNITS \$0 Reserved For User Supplied Item 0 UNITS \$0.00 / UNITS \$0 PAVEMENT REMOVAL 14,080 SQ YD \$0.00 /SQ YD \$0 SHOULDER REMOVAL 0 SQ YD \$0.00 /SQ YD \$0 Note: * Denotes User Supplied Quantity FLEXIBLE CONSTRUCTION INITIAL COST \$830,529 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$67,747 MAINTENANCE COSTS: **THICKNESS** MATERIAL **UNIT COST** ROUTINE MAINTENANCE ACTIVITY \$0.00 LANE-MILE / YEAR HMA OVERLAY PVMT SURF \$10.22 / SQ YD Surface Mix (3.75" (1.50" \$19.16 / SQ YD \$8.94 /SQYD \$10.22 /SQYD HMA SURFACE MIX Surface Mix HMA BINDER MIX Top Binder Mix HMA OVERLAY SHLD (Year 30) (1.75" Shoulder Mix \$8.94 / SQ YD \$10.22 / SQ YD HMA OVERLAY SHLD (2.00" Shoulder Mix MILLING (2.00 IN) \$2.50 /SQ YD

Surface Mix

Shoulder Mix

Shoulder Mix

Leveling Binder Mix

(100% Rehab = 110.00' / Station / Lane)

PARTIAL DEPTH PVMT PATCH

PARTIAL DEPTH SHLD PATCH

PARTIAL DEPTH PVMT PATCH

PARTIAL DEPTH SHLD PATCH

CENTERLINE JOINT ROUT & SEAL

LONGITUDINAL SHOULDER JOINT ROUT & SEAL

RANDOM / THERMAL CRACK ROUT & SEAL

(Mill & Fill Surf)

(Mill & Fill Surf)

(Mill & Fill +2.00 ")

(Mill & Fill +2.00 ")

\$90.83 / SQ YD

\$89.71 /SQYD

\$90.83 / SQ YD

\$89.71 /SQ YD

\$2.00 / LIN FT

\$2.00 / LIN FT

\$2.00 / LIN FT

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

PRES	COST		NIT COST	UNIT L	UANTITY	%		ITEM	ITENANCE COSTS:
									YEAR 5
	\$10,560		\$2.00	LINFT	5 280	100.00%		LONG SHLD JT R&S	ILAN 5
	\$5,280		\$2.00	LINFT		100.00%		CNTR LINE JOINT R&S	
			\$2.00	LINFT		50.00%		RNDM / THRM CRACK R&S	
	\$11,616		\$90.83	SQ YD				PD PVMT PATCH M&F SURF	
624	\$1,272	v	0.8626	PW=	14	0.10%	PWFn =	PD PVMI PATCH MAR SURF	
\$24	\$28,728	^	0.0020	PVV -		0.0020	PVVFII =		
		900						Distribution Control of Total	YEAR 10
	\$10,560		\$2.00	LIN FT		100.00%		LONG SHLD JT R&S	
	\$5,280		\$2.00	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$11,616		\$2.00	LINFT		50.00%		RNDM / THRM CRACK R&S	
\$25	\$6,358 \$33,814	Y	\$90.83 0.7441	SQ YD PW =	70	0.50%	PWFn =	PD PVMT PATCH M&F SURF	
Ψ25	\$55,614	^	0.7441			0.7441	r Will –		
		350							YEAR 15
	\$35,200		\$2.50		14,080	100.00%		MILL PVMT & SHLD 2.00"	
	\$12,807		\$90.83	SQYD		1.00%	2.00"	PD PVMT PATCH M&F ADD'L	
	\$143,898		\$10.22		14,080	100.00%		HMA OVERLAY PVMT 2.00"	
	\$0		\$10.22	SQ YD	0	100.00%		HMA OVERLAY SHLD 2.00 "	
\$123	\$191,905	X	0.6419	PW=		0.6419	PWFn =		
				a gressay					YEAR 20
	\$10,560		\$2.00	LIN FT	5,280	100.00%		LONG SHLD JT R&S	
	\$5,280		\$2.00	LIN FT	2,640	100.00%		CNTR LINE JOINT R&S	
	\$11,616		\$2.00	LIN FT		50.00%		RNDM / THRM CRACK R&S	
	\$1,272	BANK.	\$90.83	SQ YD	14	0.10%	AND THE BE	PD PVMT PATCH M&F SURF	
\$15	\$28,728	X	0.5537	PW=		0.5537	PWFn =		
									YEAR 25
	\$10,560	100	\$2.00	LIN FT	5,280	100.00%	Section Section	LONG SHLD JT R&S	
	\$5,280		\$2.00	LIN FT	2,640	100.00%		CNTR LINE JOINT R&S	
	\$11,616		\$2.00	LIN FT	5,808	50.00%		RNDM / THRM CRACK R&S	
	\$6,358		\$90.83	SQ YD	70	0.50%	ED STORE ENGINEER	PD PVMT PATCH M&F SURF	
\$16	\$33,814	X	0.4776	PW=		0.4776	PWFn =	HMA_SD	
	A SECTION AND A	252	A THE STATE OF THE		No. of Cases				YEAR 30
	\$35,200	850	\$2.50		14,080	100.00%		MILL PVMT ONLY 2.00"	
	\$25,614		\$90.83	SQ YD		2.00%		PD PVMT PATCH M&F ADD'L	
	\$0		\$89.71	SQ YD		1.00%	2.00"	PD SHLD PATCH M&F SURF	
	\$269,808		\$19.16		14,080	100.00%		HMA OVERLAY PVMT 3.75 "	
\$120	\$0 \$330,622	Y	\$8.94	SQ YD PW =	0	0.4120	PWFn =	HMA OVERLAY SHLD 1.75"	
\$136	φ330,022	^	0.4120	PVV =		0.4120	PVVFN =		
		N S						Individual beautiful beautiful	YEAR 35
	\$10,560		\$2.00	LINFT		100.00%		LONG SHLD JT R&S	
	\$5,280		\$2.00	LINFT		100.00%		CNTR LINE JOINT R&S	
	\$11,616		\$2.00 \$90.83	LIN FT SQ YD		50.00%		RNDM / THRM CRACK R&S	
\$10	\$1,272 \$28,728	X	0.3554	PW=	14	0.10%	PWFn =	PD PVMT PATCH M&F SURF	
	\$10,560		\$2.00	LINFT	5 280	100.00%		LONG SHLD JT R&S	YEAR 40
	\$5,280		\$2.00	LINFT	NECESTICAL PROPERTY.	100.00%		CNTR LINE JOINT R&S	
	\$11,616		\$2.00	LINFT		50.00%		RNDM / THRM CRACK R&S	
	\$6,358		\$90.83	SQ YD		0.50%		PD PVMT PATCH M&F SURF	
\$10	\$33,814	X	0.3066	PW=		0.3066	PWFn =		
\$361									
	\$0		0.00	Lane Miles	2.00		IVITY	ROUTINE MAINTENANCE ACT	
	20		0.00	Lane Willes	2.00		IVIII	ROUTINE WAINTENANCE ACT	
\$361		E-CY	NANCE LIFE	MAINTE					

PCC PAVEMENT							JPCP
ROUTE SECTION COUNTY LOCATION	Riv	ver Grove I	IL Route 21 49-Y Lake Lane to US45				
FACILITY TYPE			NTERSTATE				
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH PCC PCC	Inside Outside		1 4 2 12 0	FT ==> CL LANES EP FT FT	0.50	Miles	
PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS		JPCP	10.00 10.00		TIED SHLD		
POLICY OVERLAY THICKNESS			3.75	IN			
RIGID PAVEMENT TRAFFIC FACTOR	RS		MINIMUM 10.05		ACTUAL 3.51		USE 10.05
Worksheet Construction Type is New	Construction		10.03		avement Type is		JPCP
INITIAL COSTS ITEM	THICKNESS	100	% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT PAVEMENT REINFORCEMENT STABILIZED SUBBASE	(10.00") (4.50")		14,080 0 14,960	SQ YD	\$0.00	/SQ YD /SQ YD /SQ YD	\$573,478 \$0 \$0
PCC SHOULDERS (10.00 CURB & GUTTER	0" to 10.00")			SQ YD LIN FT		/SQ YD /LIN FT	\$0 \$0
SUBBASE GRAN MATL TY C IMPROVED SUBGRADE:	(~0.00") Aggregate			TONS SQ YD	\$25.00 \$10.00	/TON /SQ YD	\$1,100 \$53,330
Reserved For User Supplied Item Reserved For User Supplied Item				UNITS UNITS		/ UNITS / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL			14,080 0	SQ YD SQ YD		/SQ YD /SQ YD	\$0 \$0
Note: * Denotes User Supplied Quantity		RIGID CON			N INITIAL COST COST PER MILE		\$627,908 \$51,219
MAINTENANCE COSTS:	THICKNESS		MATERIAL		UNIT COST		
ROUTINE MAINTENANCE ACTIVITY					\$0.00	/ LANE-MILE	E/YEAR
HMA POLICY OVERLAY	(3.75")						
HMA POLICY OVERLAY PVMT	(3.75")	1.0065	Out with	3.75		/SQ YD	
HMA SURFACE MIX HMA BINDER MIX	(1.50") (2.25")	1.0001	Surface Mix Top Binder Mix			/SQ YD /SQ YD	
HMA POLICY OVERLAY SHLD	(3.75")		Shoulder Mix			/ SQ YD	
CLASS A PAVEMENT PATCHING					\$170.00	/ SQ YD	
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING					\$130.00 \$110.00	/ SQ YD	
PARTIAL DEPTH PVMT PATCH (Mill 8 PARTIAL DEPTH PVMT PATCH (Mill 8			Surface Mix Surface Mix		\$88.17	/SQYD /SQYD	
LONGITUDINAL SHOULDER JOINT RO	OUT & SEAL				\$2.00	/ LIN FT	
CENTERLINE JOINT ROUT & SEAL					\$2.00	/ LIN FT	
REFLECTIVE TRANSVERSE CRACK R RANDOM CRACK ROUT & SEAL		hab = 100.00°	/ Station / Lane)			/ LIN FT	

RANDOM CRACK ROUT & SEAL (100% Rehab = 100.00' / Station / Lane)

\$2.00 / LIN FT

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

PRESE WOR	COST		JNIT COST	UNIT	QUANTITY	%		ITEM	E COSTS:
	\$1,820		\$130.00	SQ YD	14	0.10%		PAVEMENT PATCH CLASS B	YEAR 10
\$1,3	\$1,820	X	0.7441	PW =		0.7441	PWFn =	PAVEMENT PATON CEASS B	
41,0	41,020								
						/ 31/2 (C. 1975)			YEAR 15
	\$3,640	100	\$130.00	SQ YD	28	0.20%		PAVEMENT PATCH CLASS B	
\$2,3	\$3,640	X	0.6419	PW=		0.6419	PWFn =		
		Details.							YEAR 20
	\$36,660		\$130.00	SQ YD	282	2.00%		PAVEMENT PATCH CLASS B	
	\$0		\$110.00	SQYD		0.50%		SHOULDER PATCH CLASS C	
	\$10,560		\$2.00	LINFT	5,280	100.00%		LONGITUDINAL SHLD JT R&S	
	\$5,280		\$2.00	LINFT	2,640	100.00%		CENTERLINE JT R&S	
\$29,0	\$52,500	X	0.5537	PW=		0.5537	PWFn =		
									YEAR 25
	\$54,860		\$130.00	SQ YD	422	3.00%		PAVEMENT PATCH CLASS B	ALCOHOLD STATE
	\$0		\$110.00	SQ YD	0	1.00%		SHOULDER PATCH CLASS C	
\$26,20	\$54,860	X	0.4776	PW=		0.4776	PWFn =		
								INTERSTATE	YEAR 30
	\$73,190	31.00	\$130.00	SQ YD	563	4.00%		PAVEMENT PATCH CLASS B	
	\$0		\$110.00	SQ YD	0	1.50%		SHOULDER PATCH CLASS C	
	\$269,808		\$19.16	SQ YD	14,080	100.00%	(PVMT)	HMA POLICY OVERLAY 3.75"	
	\$0		\$19.16	SQ YD	0	100.00%	(SHLD)	HMA POLICY OVERLAY 3.75"	
\$141,3	\$342,998	X	0.4120	PW=		0.4120	PWFn =		
								INTERSTATE	YEAR 35
	\$10,560		\$2.00	LINFT	5,280	100.00%		LONGITUDINAL SHLD JT R&S	
	\$5,280		\$2.00	LINFT	2,640	100.00%		CENTERLINE JT R&S	
	\$10,560		\$2.00	LIN FT	5,280	50.00%		RANDOM CRACK R&S	
	\$6,758		\$2.00	LINFT	3,379	40.00%	RACK R&S	REFLECTIVE TRANSVERSE CR	
	\$1,234		\$88.17	SQ YD	14	0.10%		PD PVMT PATCH M&F HMA S	
\$12,2	\$34,392	X	0.3554	PW=		0.3554	PWFn =		
								INTERSTATE	YEAR 40
	\$9,100		\$130.00	SQ YD	70	0.50%		PAVEMENT PATCH CLASS B	
	\$10,560		\$2.00	LINFT	5,280	100.00%		LONGITUDINAL SHLD JT R&S	
	\$5,280		\$2.00	LINFT		100.00%		CENTERLINE JT R&S	
	\$10,138		\$2.00	LINFT	5,069	60.00%	RACK R&S	REFLECTIVE TRANSVERSE CR	
	\$10,560		\$2.00	LIN FT		50.00%		RANDOM CRACK R&S	
	\$6,172		\$88.17	SQ YD	70	0.50%		PD PVMT PATCH M&F HMA S	
\$15,8 \$228,3	\$51,810	X	0.3066	PW=		0.3066	PWFn =		
	\$0		\$0.00	Lane Miles	2.00		VITY	ROUTINE MAINTENANCE ACTIV	
\$228,3			NANCE LIFE ANNUAL C	MAINTE			CRFn = 0.040	YEAR LIFE CYCLE (THE PROPERTY OF THE PARTY OF TH

LIFE-CYCL	E COST ANALYSIS:	NEW DESIGN Calcula	ated / Revised : 5/	23/13 11:02 AM	
			JPCP	НМА	
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$627,908	\$830,529	
		ANNUAL COST PER MILE	\$51,219	\$67,747	
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$228,375	\$361,962	
		ANNUAL COST PER MILE	\$18,629	\$29,525	
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$856,283	\$1,192,491	
		ANNUAL COST PER MILE	\$69,847	\$97,272	
LIFE-CYCL	E COST ANALYSIS:	FINAL SUMMARY			
LOWEST COST OPT	ION =====	======>	JPCP	\$69,847	
	OWEST TO HIGHEST):	TYPE / PERCENTAGE	НМА	\$97,272	39.3%

P:\Pavement Design Stuff\D-1\US 45 from IL 60 to IL 22 06-18-13\7- IL 21 from (US45 to Port Clinton Rd)\[IDOT Mechanistic Pavement Design (IL 21 from US45 to